The world's most comprehensive encyclopedia of the military weapons of the 20th century

WAR MACHINE

An ORBIS Publication

110

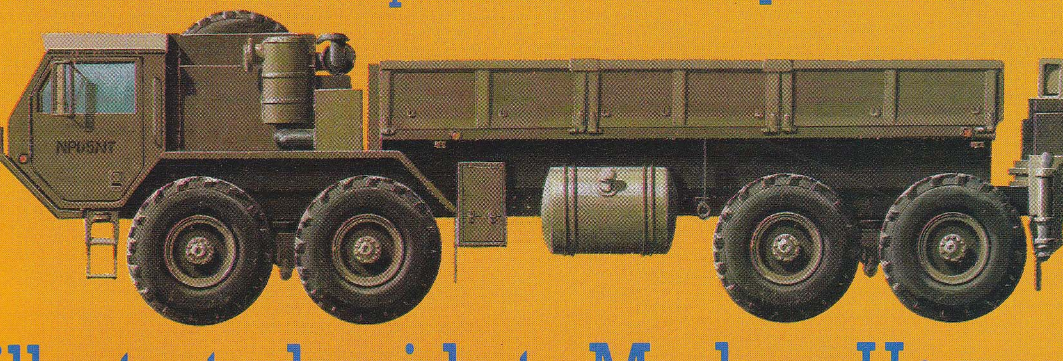
90p

IR £1.15 Aus $2.15 NZ $2.65 SA R2.45 Sing $4.50

Tank Transporters

High Mobility! The GOER proves itself in Vietnam

Armed Forces of the World: Belgium



SAMILs in Action

A fully illustrated guide to Modern Heavy Vehicles

WAR MACHINE

Volume 10 **Issue 110**

Published by
Orbis Publishing Ltd

© Aerospace Publishing Ltd 1985

Editorial Offices
War Machine
Aerospace Publishing Ltd
179 Dalling Road
London W6 0ES

Managing Editor: Stan Morse
Editorial: Trisha Palmer
Chris Bishop
Chris Chant
Ian Drury

Design: Rod Teasdale
Colour Origination: Imago Publishing Ltd, Thame, Oxon

Typesetting: SX Composing Ltd

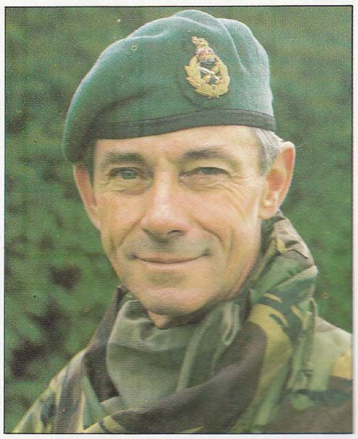
Film work: Precise Litho Ltd

Artists:
Ray Hutchins
Peter Sarson & Tony Bryan

108510

Printed in Great Britain
by The Artisan Press Ltd

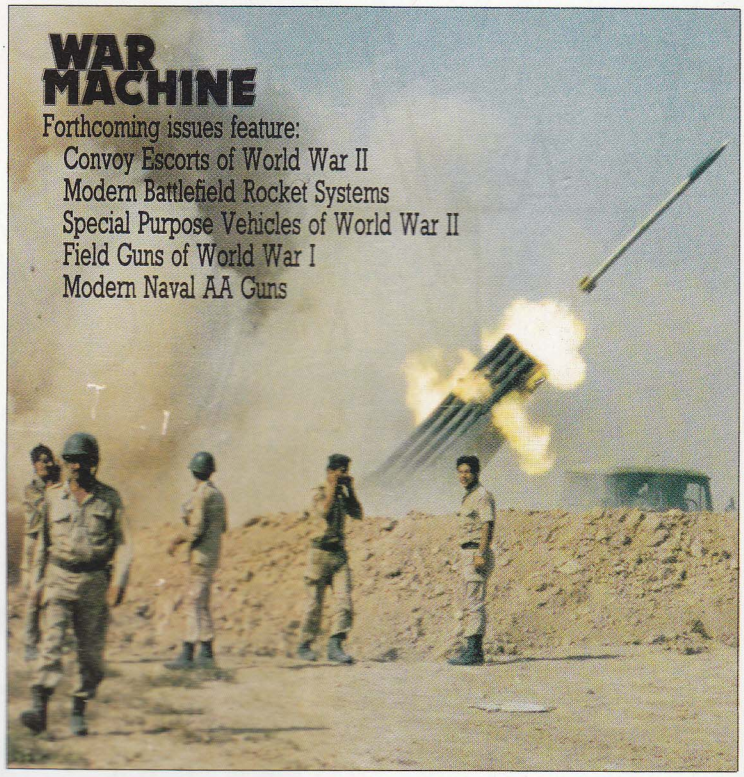
Subscription Manager: Christine Allen
0488 72666



Consultant Editor: Major General Sir Jeremy Moore KCB OBE MC, Commander of British Land Forces during the Falklands campaign.

Distribution and marketing offices:
Orbis Publishing Ltd
Orbis House
20-22 Bedfordbury
London WC2N 4BT
Telephone: 01-379 6711

Circulation Director: David Breed
Marketing Director: Michael Joyce



WAR MACHINE
Forthcoming issues feature:
Convoy Escorts of World War II
Modern Battlefield Rocket Systems
Special Purpose Vehicles of World War II
Field Guns of World War I
Modern Naval AA Guns

Picture acknowledgements

Cover photograph: R.F. **2181:** R.F./Herman Potgieter. **2182:** R.F./R.F./R.F. **2183:** Netherlands Army/R.F./R.F./MAN. **2184:** R.F. **2185:** R.F. **2186:** R.F./R.F./R.F. **2187:** R.F./R.F. **2188:** R.F./R.F. **2189:** R.F. **2193:** R.F./R.F. **2194:** R.F./R.F./R.F. **2195:** South African Defence Force. **2196:** R.F. **2197:** Herman Potgieter/Herman Potgieter. **2198:** R.F./R.F. **2199:** R.F./R.F./R.F. **2200:** R.F./R.F. **(iii):** Belgian Army/Belgian Army. **(iv):** Bob Munro/Belgian Ministry of Defence.

HOW TO OBTAIN ISSUES AND BINDERS FOR WAR MACHINE

Issues can be obtained by placing an order with your newsagent or direct from our Subscription Department. If you have difficulty obtaining any back issues from your newsagent, please write to us stating the issue(s) required and enclosing a cheque for the cover price of the issue(s).

AUSTRALIA please write to: Gordon and Gotch (Aus) Ltd, 114 William Street, PO Box 767G, Melbourne, Victoria 3001. MALTA, NEW ZEALAND, SINGAPORE & SOUTH AFRICA: Back numbers are available at cover price from your newsagent. In case of difficulty, write to the address given for binders.

UK/EIRE
ISSUE PRICE: 90p/IR£1.15
SUBSCRIPTION:
6 Months: £26.00
1 Year: £52.00
BINDER: Please send £3.95 per binder, or take advantage of our special offer in early issues.

EUROPE
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £44.72
surface: £36.14
1 Year air: £89.44
surface: £72.28
BINDER: (inc. Postage)
air: £5.50
surface: £5.00

MALTA
Obtain BINDERS from
your newsagent or
Miller (Malta) Ltd,
MA Vassalli Street,
Valetta, Malta
Price: £3.95

MIDDLE EAST
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £50.18
surface: £36.14
1 Year air: £100.36
surface: £72.28
BINDER: (inc. Postage)
air: £8.25
surface: £5.50

AMERICAS/ASIA/AFRICA
ISSUE PRICE: US$1.95/90p
SUBSCRIPTION:
6 Months air: £59.24
surface: £36.14
1 Year air: £119.08
surface: £72.28
BINDER: (inc. Postage)
air: £9.50
surface: £5.50

SOUTH AFRICA
ISSUE PRICE: SA R2.45
Obtain BINDERS from
any branch of Central
News Agency or
Intermag, PO Box
57394, Springfield 2137

SINGAPORE
ISSUE PRICE: Sing$4.50
Obtain BINDERS from
MPH Distributors
601 Sims Drive
03-07-21
Singapore 1438

AUSTRALASIA/FAR EAST
ISSUE PRICE: 90p
SUBSCRIPTION:
6 Months air: £64.22
surface: £36.14
1 Year air: £128.44
surface: £72.28

AUSTRALIA
ISSUE PRICE: AUS $2.15
Obtain BINDERS from
First Post Pty Ltd,
23 Chandos Street
St Leonards,
NSW 2065

NEW ZEALAND
ISSUE PRICE: NZ $2.65
Obtain BINDERS from
your newsagent or
Gordon & Gotch (NZ)
Ltd, PO Box 1595,
Wellington

ADDRESS FOR BINDERS AND BACK ISSUES
Orbis Publishing Limited
Orbis House
20-22 Bedfordbury
London
WC2N 4BT
Telephone: 01-379-5211

Cheques/Postal Orders should be made payable to Orbis Publishing Limited. Binder prices include postage and packing and prices are in sterling.

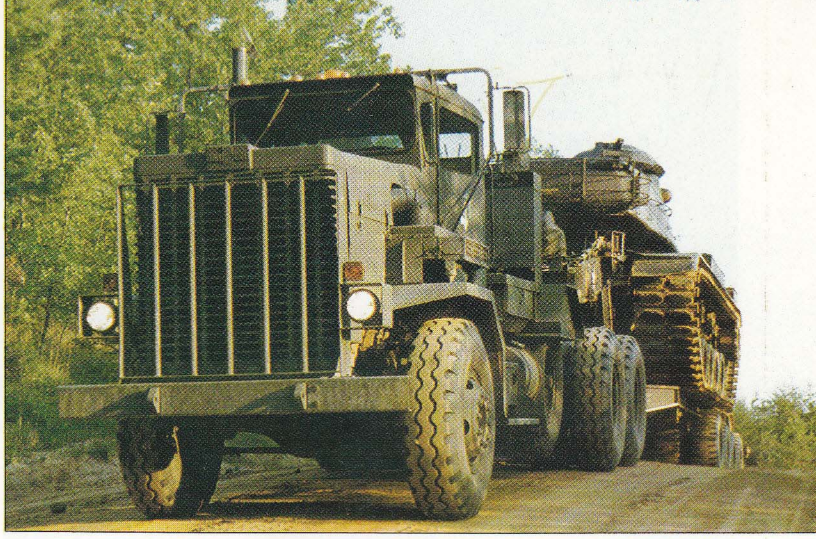
Back Issues are sold at the cover price, and we do not charge carriage in the UK.

NOTE
Binders and back issues are obtainable subject to availability of stocks. Whilst every attempt is made to keep the price of the issues and binders constant, the publishers reserve the right to increase the stated prices at any time when circumstances dictate. Binders depicted in this publication are those produced for the UK and Australian markets only. Binders and Issues may be subject to import duty and/or local taxes, which are not included in the above prices unless stated.

ADDRESS FOR SUBSCRIPTIONS
Orbis Publishing Limited
Hurst Farm
Baydon Road
Lambourne Woodlands
Newbury
Berks
RG16 7TW
Telephone: 0488-72666

All cheques/Postal Orders should be made payable to Orbis Publishing Limited. Postage and packaging is included in subscription rates, and prices are given in Sterling.

Modern Heavy Vehicles



This Oshkosh M911 (8×6) tractor truck of the US Army is essentially a standard civilian vehicle with the minimum of modifications for military use to keep procurement costs down. The M911 shown here is towing a semi-trailer carrying an M60 MBT. Over 700 M911s are in service.

The insatiable logistic requirements of modern armies are met by vast transport fleets that now include massive all-wheel-drive trucks capable of carrying cargoes of up to 10 tonnes over rough terrain. These vehicles are also used for a multitude of other tasks, serving as mobile command posts, missile platforms and tank transporters.

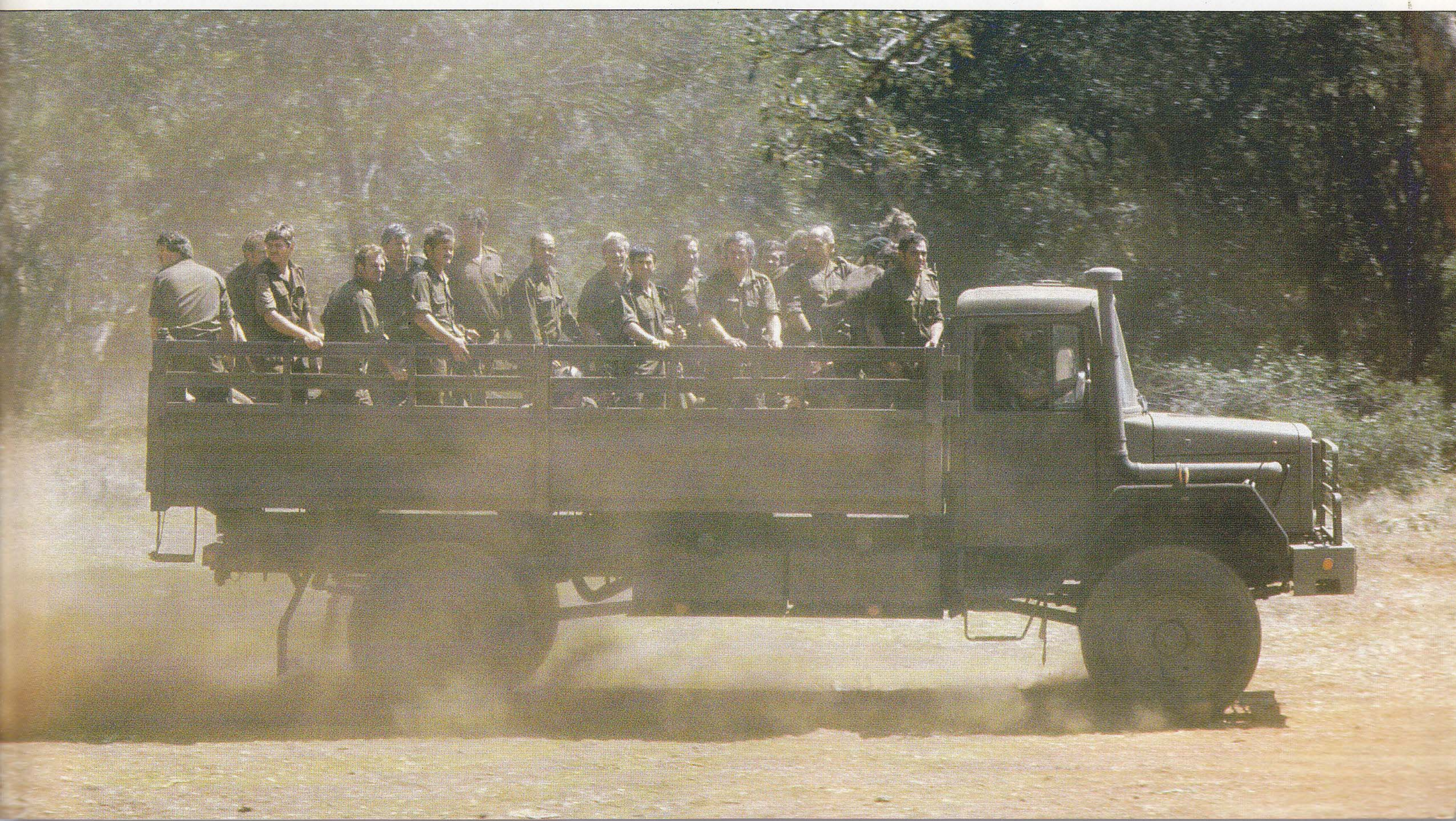
In addition to light 4×4 vehicles such as the Land Rover and M151 that are used for general duties, ranging from reconnaissance to carrying personnel and light cargo, all armies have a range of heavier transports for carrying general cargo. In rear areas 4×2, 6×4 or 8×4 vehicles can be used for this role, but in forward areas all-wheel-drive is vital as the previous vehicles have little or no cross-country mobility and cannot keep forward units supplied with ammunition, fuel and other essential matériel.

In recent years most Western armies have been upgrading their transport fleets by introducing new all-wheel-drive vehicles with increased load-carrying capabilities. For example, in the French army the Berliet GBU 15 6×6 6000 kg (13,228-lb) truck is now being replaced by the Renault TRM 10 000 truck which can carry 10000 kg (22,046 lb). In the period after the end of World War II, many military trucks were built specifically to meet military requirements. These vehicles proved expensive to maintain and operate, and in recent years the trend has been to design military vehicles using standard civilian automotive components to keep life cycle costs down to an absolute minimum. Virtually all military trucks today are powered by diesel engines, which are much more fuel efficient than petrol engines and therefore have greater operational ranges, as well as reduced risk of fire.

Much more emphasis is now being given to the rapid loading and unloading of cargo in the field, and many modern trucks have their own cranes so that they can shift cargo quickly at any time without external assistance. Wherever possible loads (for example food and ammunition) are now packed on pallets, which enables a truck to unload in a matter of minutes before returning to the rear for more supplies.

Although cargo trucks are a key part of any current army, there are many other types of heavy truck in service, ranging from recovery vehicles, tractor trucks, dump trucks, command posts, vehicles to carry sections of bridges and other engineer equipment, missile platforms and tank transporters, to name but a few. In every army today trucks of one kind or another are the most widely used vehicle type, and no army in the world can function without them.

In addition to being used as a cargo truck carrying 4800 kg (10,582 lb), the SAMIL 50 (4×4) truck is widely used as a troop transporter. In the rear cargo area are removable bench seats down the centre and either side that allow a maximum of 40 fully-equipped troops to be carried.



SPAIN

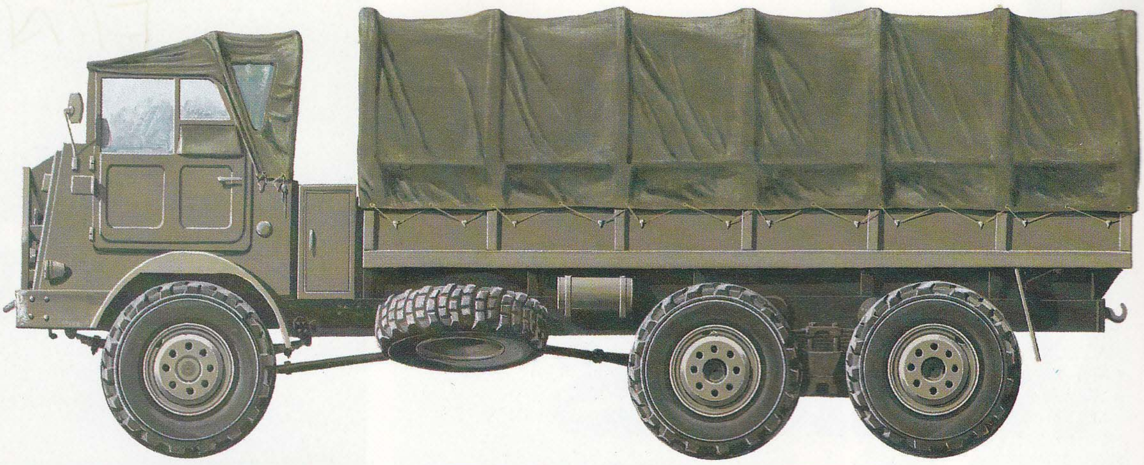
Pegaso 3055

For the last 10 years or so the standard 6000-kg (13,228-lb) truck of the Spanish army has been the **Pegaso 3050** 6×6 vehicle which uses the cab of the **Pegaso 3045** 4×4 3000-kg (6,614-lb) truck, itself based on an improved version of the **DAF YA 314** 4×4 truck that was in production for the Dutch army between 1955 and 1965. In addition to the basic cargo version of the Pegaso 3050, more specialized versions include recovery trucks, a tractor truck for towing semi-trailers, a bridge-carrying truck, a shop/van and prototype mountings of the Santa Barbara 140-mm (5.51-in) Teruel multiple rocket system.

The Pegaso 3050 is now being supplemented by the new **Pegaso 3055** 6×6 truck, which can carry a maximum payload of 6000 kg (13,228 lb) across country or 10000 kg (22,046 lb) on roads. The Pegaso 3055 is essentially a 6×6 version of the Pegaso 3045 truck with the same cab but a more powerful engine and a different transmission. The Pegaso 3055 can tow a trailer or weapon weighing a maximum of 7500 kg (16,535 lb) across country or 14500 kg (31,967 lb) on roads.

The cab is of the forward control type and is fitted with a removable canvas hood and windscreen that can be folded forwards; this feature (common to many military trucks today) facilitates air transport. The Pegaso-built engine is coupled to a manual gearbox with six forward and one reverse gear and a two-speed transfer case. Suspension (front and rear) consists of semi-elliptical springs with telescopic shock absorbers for the front wheels only. Tyres are 13.00×20 or 14.00×20 all round, the rear wheels having single tyres. The rear cargo area has fixed steel sides, a drop tailgate, removable bows and a canvas cover, and collapsible seats are provided for 30 troops. The vehicle is offered with a 149.1-kW (200-hp) or 164.1-kW (220 hp) engine, the latter having been selected for Spanish army vehicles.

In addition to the basic cargo model, Pegaso now offers a complete range of variants including a tractor truck for towing semi-trailers, recovery and crane trucks, a fuel or water tanker, a fire fighting vehicle, various boxed bodies for specialized roles, and a dump truck. The Pegaso 3055 chassis is also being used for production versions of the 140-mm Teruel multiple rocket-launcher system.



Above: The Pegaso 3055 (6×6) truck is a further development of the Pegaso 3046 (4×4) truck, and in 1982 was selected to be the standard truck in its class of the Spanish armed forces. The rear cargo area has a drop tailgate, removable bows and cover.

Right: The standard cargo version of the Pegaso 3055 has seats for 30 fully-equipped infantrymen; these can be quickly folded up to allow cargo to be carried. A number of variants of the Pegaso 3055 are now being developed, including a tractor truck and recovery vehicle.

The Pegaso 3055 can also be used to tow field artillery such as this 155-mm (6.1-in) M114 howitzer. The Pegaso turbocharged diesel engine is coupled to a manual transmission and a two-speed transfer case.

Specification

Pegaso 3055

Crew: 1+1

Weights: empty 9000 kg (19,842 lb); loaded 15000 kg (33,069 lb)

Powerplant: one Pegaso Model 92210/10 6-cylinder diesel developing 149.1 kW (200 hp)

Dimensions: length 6.956 m (22 ft 9.8 in); width 2.406 m (7 ft 10.7 in); height 2.765 m (9 ft 0.9 in)

Performance: maximum road speed 80 km/h (50 mph); maximum road range 550 km (342 miles); fording 1.0 m (3 ft 3 in); gradient 51 per cent; side slope 30 per cent

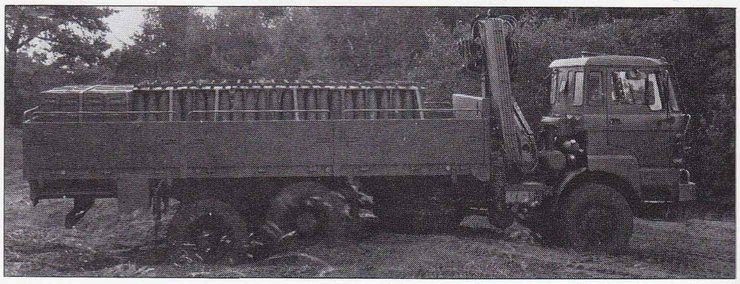
---

NETHERLANDS

DAF YAZ 2300

Between 1957 and 1968 DAF trucks delivered a large number of **YA 616** 6×6 6000-kg (13,228-lb) cross-country trucks to the Dutch army. Specialized versions of this include the **YA 616 VL** flat-bed cargo truck, the **YB 616** and **YB 626** recovery vehicles, the **YF 616** tanker, the **YK 616** three-way tipper and the **YT 616** tractor truck. These are now being replaced by the **DAF YAZ 2300** 6×6 truck which is essentially a standard civil vehicle modified to suit military requirements, and which can carry 10000 kg (22,046 lb) of cargo across country.

The fully-enclosed two-door three-man cab can be tilted forward to allow



The DAF YAZ 2300 can carry 10000 kg (22,046 lb) of cargo on roads and across country. This truck is fitted with a hydraulic crane to the cab rear, which is used to unload the pallets of ammunition. Before the crane is used stabilizers are lowered to the ground on each side.

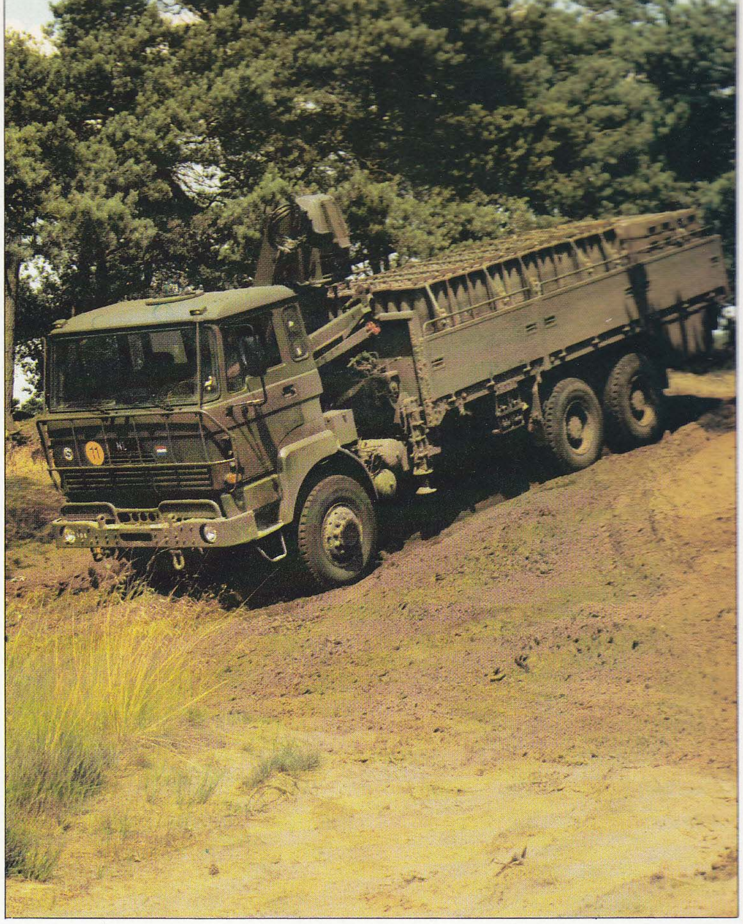
access to the engine. The latter is coupled to a gearbox with eight forward and one reverse gear and a transfer box with a lockable differential. Suspension consists of semi-elliptical springs, the front wheels having hydraulic double-action shock-absorbers. Steering is power-assisted. The rear cargo area is fitted with removable sides and a drop tailgate, and to the cab rear is a hydraulic crane for unloading cargo. Before this crane is used a hydraulic stabilizer is lowered to the ground on each side to steady the vehicle.

Standard equipment on all Dutch army YAZ 2300 trucks includes military lighting, an observation hatch for an anti-aircraft machine-gun (on the cargo model only), a trailer connector, and a slave connector for providing power to start other vehicles. Optional equipment includes an automatic gearbox in place of the standard ZF manual gearbox, and a four-man fully-enclosed cab.

As usual the YAZ 2300 is the basic member of a complete family of vehicles. The tipper model is the **YKZ 2300** and is produced with or without a winch; the rear tipping body can be used to the side or rear, a useful feature for military construction. The truck tractor model is the **YTV 2300**, and is of 4×4 rather than 6×6 configuration. The recovery model is the **YBZ 2300**, while the special model to carry and launch the Ribbon Bridge is the **YGZ 2300**. This carries the Ribbon Bridge in the folded position and backs up to the edge of the river; the Ribbon Bridge section then slides off the back of the truck into the water, where it automatically unfolds. The individual sections are then coupled up to form a bridge.

Specification
DAF YAZ 2300
Crew: 1+2
Weights: empty 13000 kg (28,660 lb); loaded 23000 kg (50,706 lb)
Powerplant: one of DAF DHS 825 6-cylinder turbocharged diesel developing 182.7 kW (245 hp)
Dimensions: length 9.58 m (31 ft 5.2 in); width 2.49 m (8 ft 2.0 in); height 3.59 m (11 ft 9.3 in)
Performance: maximum road speed 80 km/h (50 mph); maximum road range 600 km (373 miles); fording 0.75 m (2 ft 6 in); gradient 50 per cent; side slope 30 per cent

The first production DAF YAZ 2300 trucks were delivered to the Dutch army in 1983, and are replacements for the DAF YA 616 trucks first fielded some 25 years ago. Variants of the YAZ 2300 include a three-way tipper, a tractor truck for towing semi-trailers, and recovery and engineer vehicles.



WEST GERMANY

MAN 20.280 DFAEG

Between 1976 and 1981 MAN delivered over 8,000 4×4, 6×6 and 8×8 High Mobility Tactical Trucks to the West German army, these being known as Category 1 vehicles. For the export market the company developed the **MAN 14.240 FAEG** 4×4 and **MAN 20.280 DFAEG** 6×6 cross-country trucks with payloads of 6000 kg (13,228 lb) and 10000 kg (22,046 lb) respectively. These use the same suspension as the Category 1 vehicles but are powered by standard MAN 6-cylinder inline water-cooled engines rather than KHD engines.

The chassis of the MAN 20.280 DFAEG truck consists of hollow-section longitudinal members with tubular cross sections. The fully-enclosed two-door cab is a standard commercial pattern with an observation hatch in the roof, and can be tilted forwards to allow access to the engine for maintenance purposes. A spare wheel is carried to the cab rear, and the rear cargo area has drop sides, a drop tailgate, removable bows and a tarpaulin cover. The engine is coupled to a manual gearbox with six forward and one reverse gear and a two-speed transfer case. The steering is power-assisted. Suspension, all round, consists of progressive coil springs and hydraulic telescopic shock absorbers. These vehicles are not used by the West German army but export sales have been made to a number of countries including Algeria, Eire, Singapore and Venezuela.

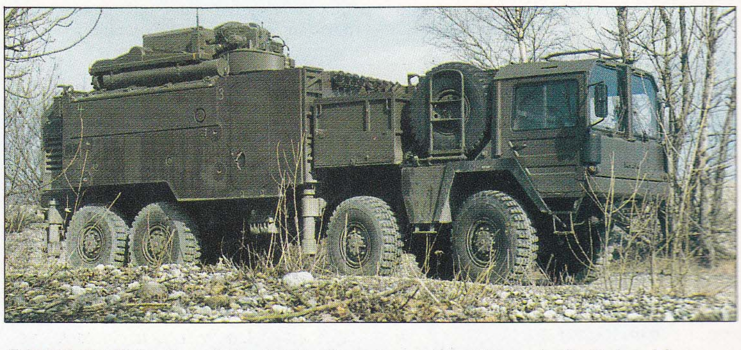
MAN often adapts standard commercial trucks to meet specific overseas military requirements, and several years ago the company supplied some 3,000 of its **MAN 11.136 HA** 4×4 trucks to the Belgian army. These vehicles have a maximum payload of 5000 kg (11,023 lb) and are powered by a MAN/Renault 797/06 6-cylinder water-cooled diesel developing 111.9 kW (150 hp) and coupled to a manual gearbox with five forward and one reverse gear, and a two-speed transfer case.

Most military cargo trucks today are fitted with a cargo body with removable sides, a tailgate, bows and a tarpaulin cover. This enables them to carry containers not only for cargo but also fitted out for specialized roles, for example as command posts, electronic warfare centres, operating theatres and other medical facilities, workshops and repair units. In many cases the vehicle is driven to the point where the specialist body is required: the body is then removed with the aid of a crane or onboard equipment, and the truck is driven away and used for general cargo work. The use of drop sides enables pallets of supplies and ammunition to be quickly loaded or unloaded with the aid of a forklift truck. Some countries have developed special refuelling pods that can be quickly fitted into the rear of a military truck to enable them to refuel vehicles and helicopters in forward areas.

Specification
MAN 20.280 DFAEG
Crew: 1+2
Weights: empty 10300 kg (22,708 lb); loaded 20300 kg (44,754 lb)
Powerplant: one MAN D2566 MTFG 6-cylinder diesel developing 208.8 kW (280 hp)
Dimensions: length 8.95 m (29 ft 4.4 in); width 2.49 m (8 ft 2.0 in); height (cab) 3.01 m (9 ft 10.5 in)
Performance: maximum road speed 80 km/h (50 mph); maximum range 1000 km (621 miles); fording 1.0 m (3 ft 3 in); gradient 60 per cent; side slope 30 per cent

The MAN 20.280 DFAEG truck shows its cross-country mobility. This vehicle has been developed by MAN for the export market, and uses parts of the MAN 4×4, 6×6 and 8×8 high mobility vehicles developed specifically to meet West German army requirements.

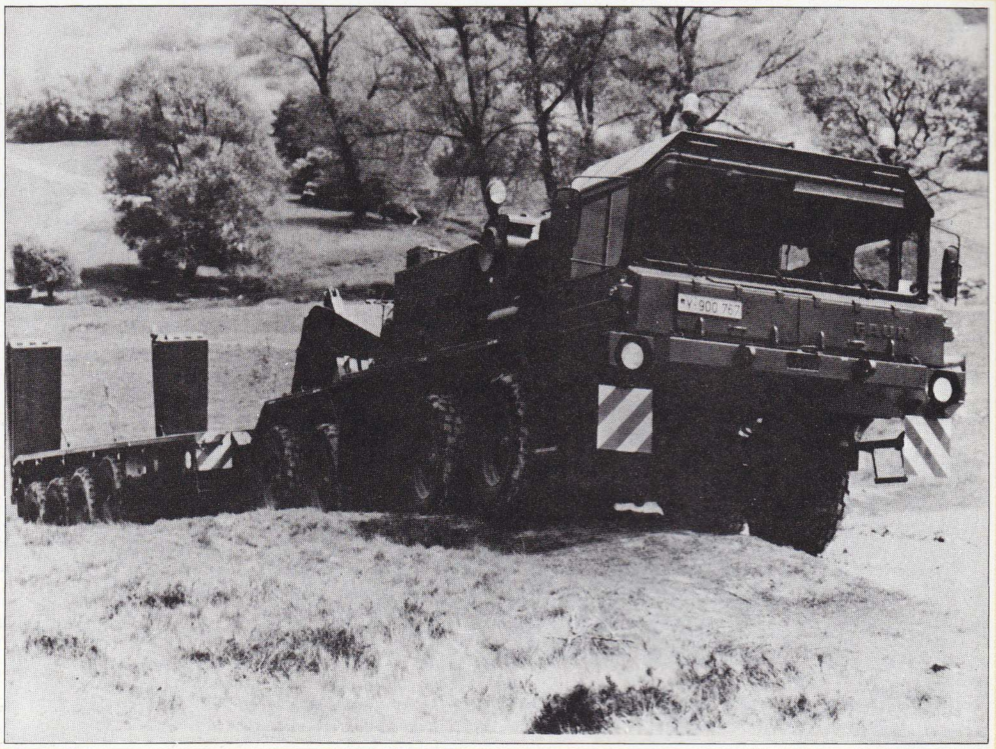
The MAN 14.240 FAEG has been exported in some numbers. The fully enclosed two-man forward control cab can be tilted forwards to allow access to the engine and transmission for maintenance purposes. Optional equipment includes a hydraulic winch.



A MAN (8×8) high mobility tactical truck carries a Euromissile Roland 2 surface-to-air missile system, with radars and launchers retracted into the travelling configuration. This model will be used to defend key Luftwaffe and United States Air Forces airfields in West Germany.

Tank Transporters

Tank transporters are a vital element in a mechanized army, enabling armoured forces to move long distances without any wear and tear on vehicles or crews. They carry tanks to and from repair shops behind the battlefront and prevent armoured vehicles from chewing up the roads in peacetime.



By 1980 the West German army had taken delivery of 328 Faun SLT 50-2 tractor trucks (8×8), commonly known as the Elefant. These are used to tow semi-trailers carrying all MBTs including the Leopard 2. To the rear of the four-man cab are two hydraulic winches.

Tracked armoured vehicles are by their nature usually noisy, heavy and very expensive to maintain and operate. In peacetime tank transporters are used for a variety of roles such as moving tanks and other armoured vehicles from front-line units back to the factory or base workshop for repair and overhaul. If the training area is some distance from the AFV unit's base, the armoured vehicles are often moved by train or tank transporter as this saves damage to roads and is normally quicker and cheaper. In many countries tanks are only allowed to travel a certain distance per year, often less than 1000 km (621 miles), so that the operator is generally unwilling to waste his mileage allowance going to and from the training area.

In wartime tank transporters would have additional roles in ferrying new tanks to the FLOT (forward line of troops), bringing back any that had been damaged and rapidly switching tanks from one part of the front to another. In the Middle East wars Israel used its fleet of tank transporters for the rapid transfer of tanks from the northern front (against Syria) to the southern front (against Egypt). The tanks could have done this under their own power, but by using transporters the Israelis ensured that all the tanks arrived in good condition with their crews ready for combat.

In tank battles there are many vehicle casualties, and armies differ on how these are recovered. The British army prefers to repair the tanks as far forward as possible, bringing back to the rear only those vehicles that cannot be repaired with the equipment on hand. Things such as broken engines are changed in the field, in the case of the Chieftain MBT with an FV434 armoured repair vehicle which is a member of the FV432 family.

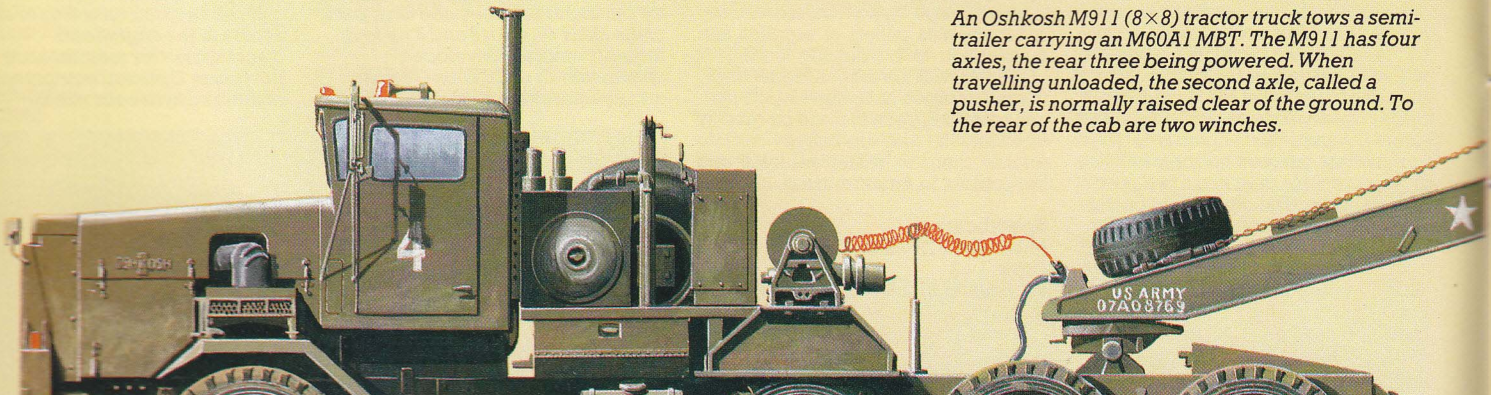
In many cases the introduction of a new MBT can result in major problems for the operator, especially if the new type is heavier than the existing vehicle. A recent example of this is the introduction into the British army of the Challenger MBT, which has led to the issuing of a requirement for a new armoured recovery vehicle, the strengthening of the Medium Girder Bridge and of the M2 Amphibious Bridge and Ferry System, and the supply of new tank transporters. The French army will have similar problems when the current AMX-30 MBT, which weighs about 36000 kg (79,365 lb) is replaced by the EPC MBT weighing about 50000 kg (110,229 lb) in the early 1990s.

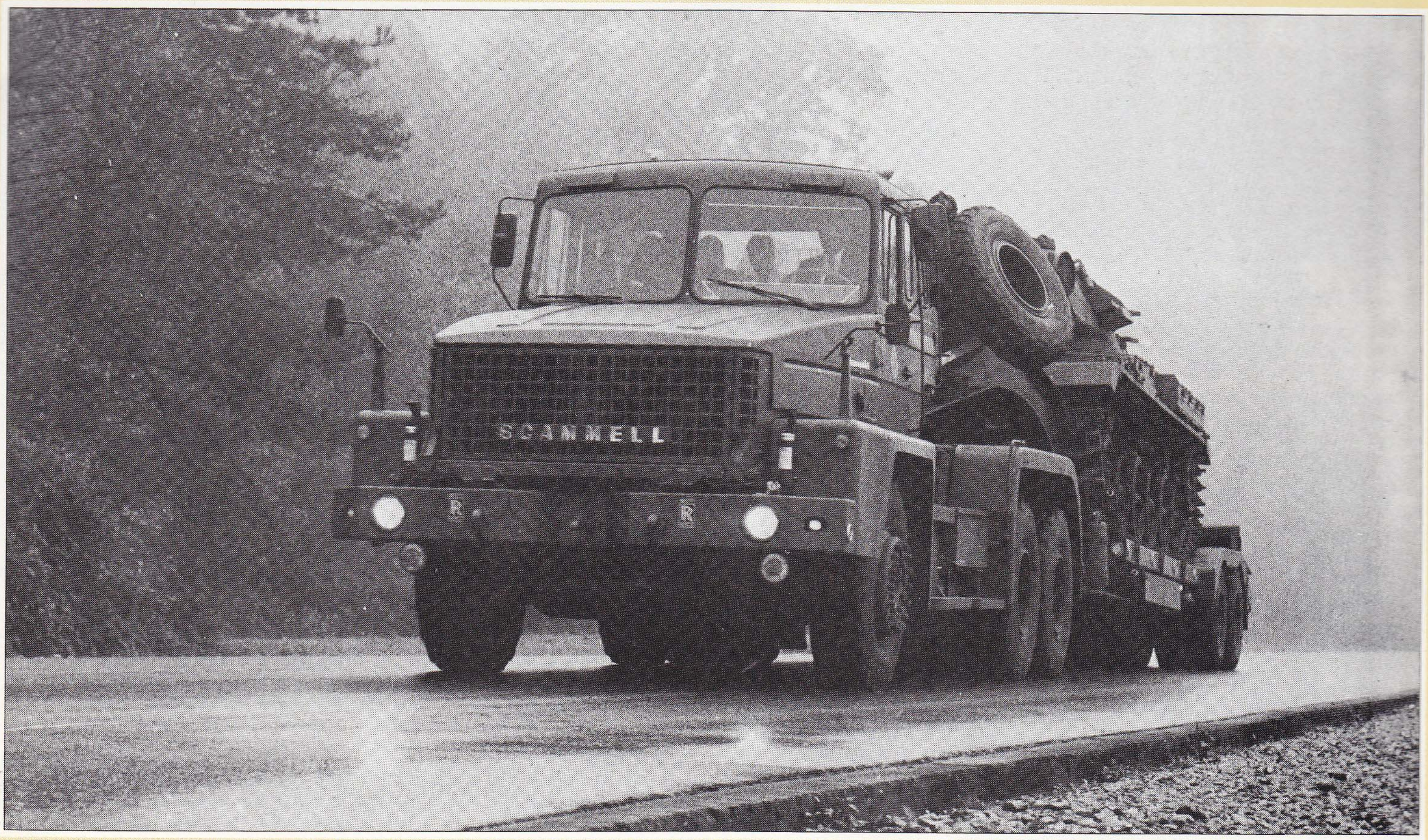
West German tank transporters

The West German army today has two basic types of tank transporter, the civilian 6×4 which is used in rear areas, and the two Faun tractor trucks that can tow semi-trailers carrying tanks. The Faun SLT 50-2 8×8 tractor truck is commonly called the Elefant, and its development can be traced back almost 20 years to the Heavy Equipment Transporter (HET) developed by West Germany and the USA to carry the proposed MBT-70 tank. When the MBT-70 was cancelled in 1970, West Germany continued development which resulted in the SLT 50-2, while the USA also continued development which resulted in the M746 tractor truck now in service with the US Army.

The SLT 50-2 has full 8×8 drive with powered steering on the front two axles, and is powered by an MTU MB 837 Ea-500 V-8 diesel developing 544.3 kW (730 hp). To the rear of the fully-enclosed four-man cab are two winches each with a capacity of 17000 kg (37,479 lb) which are used to winch the tank onto the semi-trailer when the tank's own engine is not running. The semi-trailer, built by Karl Kässbohrer, is unusual in that it has at the rear four axles, each of which has two single-

An Oshkosh M911 (8×8) tractor truck tows a semi-trailer carrying an M60A1 MBT. The M911 has four axles, the rear three being powered. When travelling unloaded, the second axle, called a pusher, is normally raised clear of the ground. To the rear of the cab are two winches.





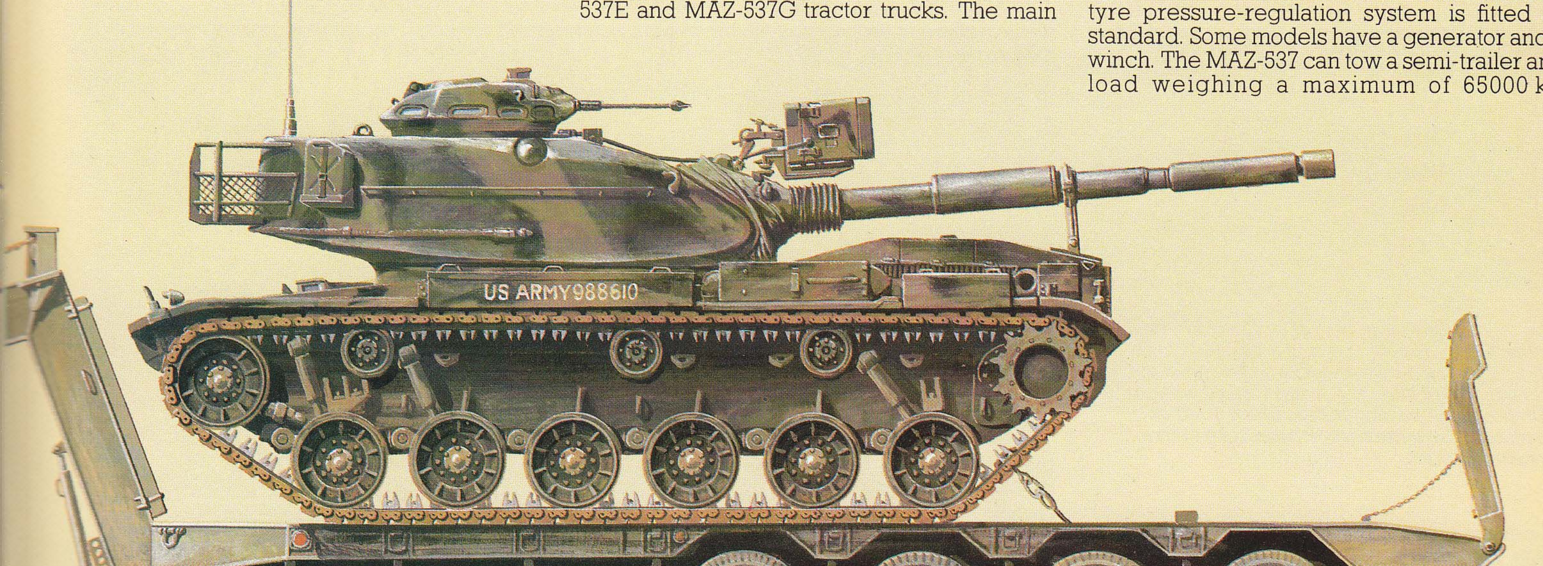
A Scammell Commander (6×4) tractor truck of the British Army tows a semi-trailer carrying a Chieftain MBT. A total of 125 of these have been ordered to replace the old Antar vehicles, which are now some 30 years old, with the first production vehicles delivered late in 1983.

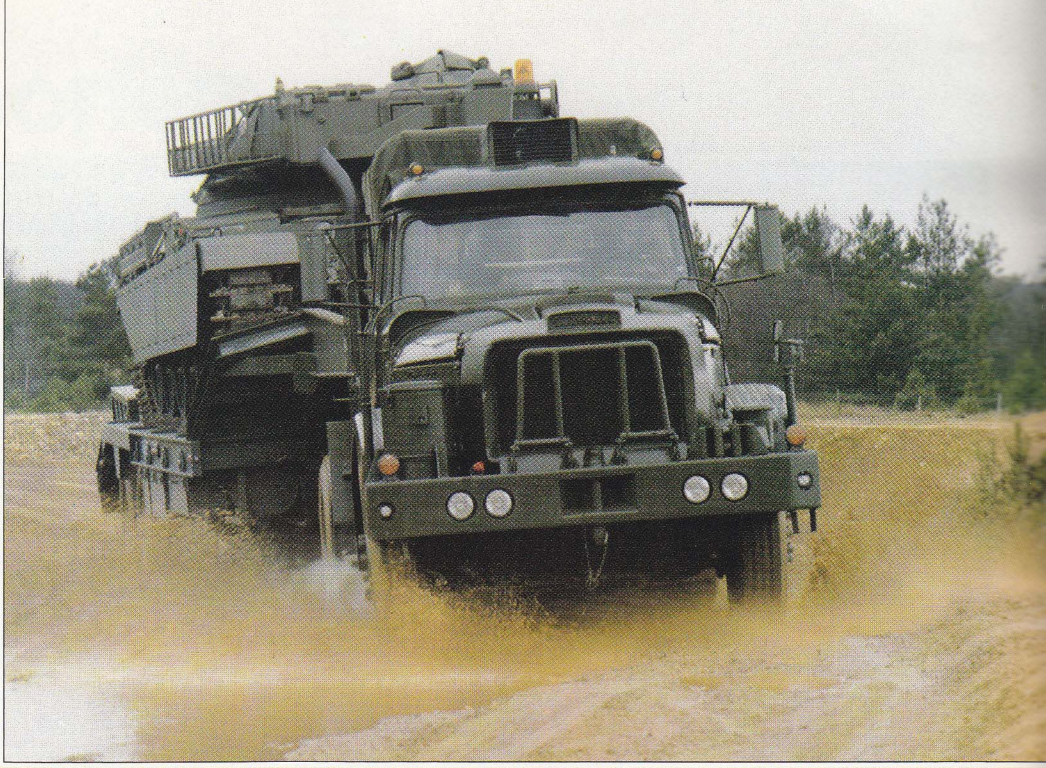
tyred steerable wheels; this allows the tractor truck and semi-trailer to go round much tighter bends than would otherwise be the case. A total of 328 SLT 50-2 tractor trucks was delivered to the West German army, final deliveries being made in 1980.

The Faun FS 42.75/42 tractor truck is similar in appearance to the SLT 50-2 but is only 8×6, has a less powerful Deutz engine, and tows a semi-trailer capable of carrying a maximum load of about 37500 kg (82,673 lb).

Soviet tank transporters

The most powerful tank transporter in service with the Soviet army is the MAZ-537 8×8 tractor truck produced at the Minsk Motor Vehicle Plant and introduced some 20 years ago. This is a member of the MAZ-535/MAZ-537 family of vehicles used for a variety of civil and military roles. Vehicles of this family include the MAZ-535A, MAZ-537A and MAZ-537K cargo trucks, and the MAZ-537, MAZ-537D, MAZ-537E and MAZ-537G tractor trucks. The main difference between the MAZ-535 and MAZ-537 series is that the latter is powered by a V-12 water-cooled diesel developing 391.5 kW (525 hp) while the former has the same engine but derated to 279.6 kW (375 hp). Steering is hydraulic on the front four wheels, and a central tyre pressure-regulation system is fitted as standard. Some models have a generator and a winch. The MAZ-537 can tow a semi-trailer and load weighing a maximum of 65000 kg





A Scammell Contractor (6×4) tractor truck tows a semi-trailer carrying a Chieftain MBT. Although originally developed for civilian applications, the Contractor is widely used as a tank transporter and known users include Australia, Jordan, Kenya and Libya.

(143,300 lb) on roads, but less than half of this across country. The cargo truck version can tow trailers carrying armoured vehicles, and is also used to tow trailers carrying missiles.

Tractor truck versions of the other Soviet trucks, e.g. the KrAZ-255B and the older KrAZ-214 6×6 trucks, are widely used towing semi-trailers carrying lighter armoured vehicles. The Czechs use various models of the Tatra 813 range of 8×8, 6×6 and 4×4 vehicles to tow trailers.

British tank transporters

Since the 1950s the standard tank transporter of the British army has been the Thornycroft Antar 6×4 vehicle powered by a Rolls-Royce 8-cylinder supercharged diesel developing 248.3 kW (333 bhp). This can tow a semi-trailer carrying a maximum load of 60000 kg (132,275 lb). Many of these are now over 25 years old and are today being replaced by the Scammell Commander 6×4 tractor truck which can tow a semi-trailer carrying MBTs weighing up to 65000 kg (143,298 lb) such as the new British Challenger. Mounted to the rear of the cab is a winch with a capacity of 20000 kg (44,092 lb) to haul damaged and disabled vehicles onto the semi-trailer. In the British army tank transporters are operated by the Royal Corps of Transport (RCT).

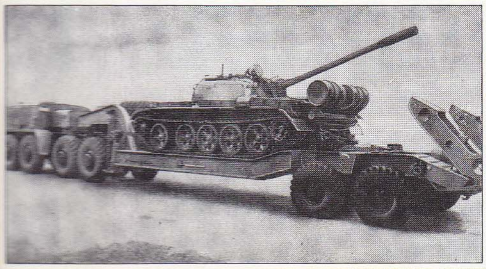
The British army also uses two versions of the civil Scammel Crusader 6×4 tractor truck, one rated at 20000 kg (44,092 lb) and the other at 35000 kg (77,160 lb). These are used to tow semi-trailers carrying lighter armoured vehicles such as the Scorpion and FV432, while the Royal Engineers use them to carry construction equipment and the Combat Engineer Tractor. Scammell Motors have also supplied the Contractor 6×4 tractor truck to many countries including Australia, Jordan, Kenya and Libya. These vehicles are available for civil and military applications with various ratings and optional equipment such as winches.

US tank transporters

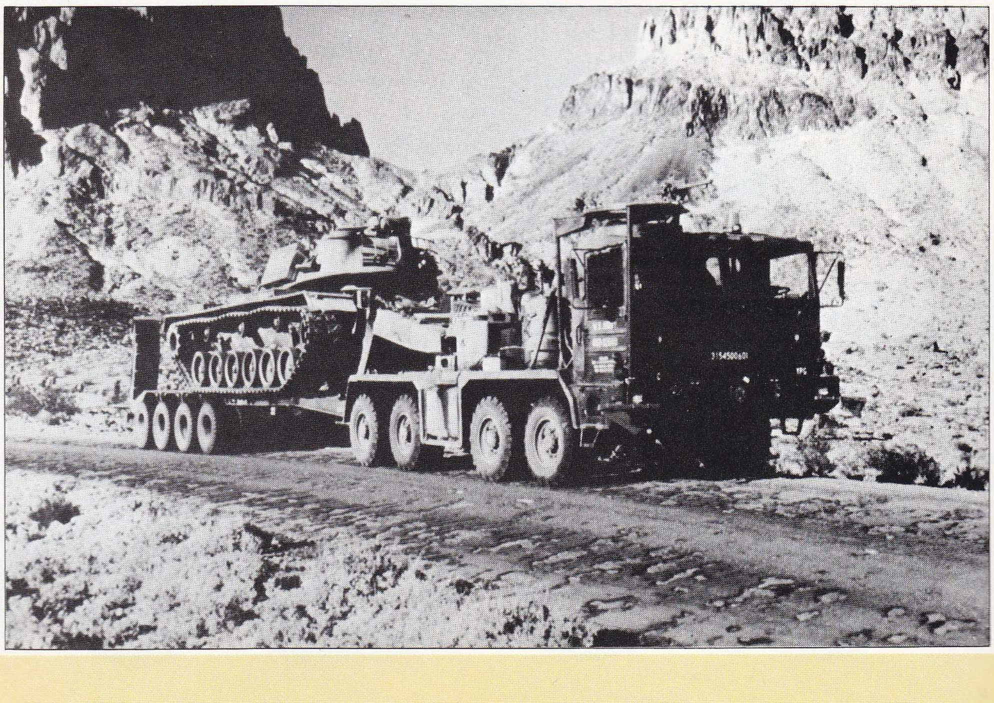
Following the cancellation of the West German/US MBT-70 project, the Heavy Equipment Transporter (HET) designed to carry this tank was also cancelled. The USA continued development, however, and in the end 125 of these vehicles were delivered to the US Army as the M746 by Ward LaFrance Truck Corporation, although the original prototypes were built by Chrysler. The M746 is an 8×8 vehicle with powered steering on the front four wheels, a fully-enclosed cab, and two winches each with a capacity of 27216 kg (60,000 lb) at the rear. The M746 tows an M747 semi-trailer which can carry a maximum load, e.g. an M60 or M1 tank, weighing up to 54500 kg (120,150 lb). The combination of M746 and M747 is, however, very expensive and the US Army issued a requirement for a much simpler truck tractor in 1976. Eventually it selected a modified version of the civil Oshkosh F2365 truck, which it designates the M911. A total of 747 was subsequently delivered to the US Army, a further 12 being supplied to Thailand to tow semi-trailers carrying M48A5 MBTs. Mounted to the rear of the cab are twin winches each with a capacity of 20412 kg (45,000 lb) to draw vehicles onto the semi-trailer. An unusual feature of the M911 is that it is an 8×6 vehicle as the second axle is a so-called pusher: this is lowered to the ground when a heavy load is being carried on the semi-trailer, so reducing the total load on the rear tandem.

The M911 is powered by a Detroit-Diesel Model 8V-92TA-90 engine developing 324.4 kW (435 bhp) coupled to an Allison CLBT-750 automatic transmission with five forward and one reverse gear and a two-speed transfer case.

Other tractor trucks used by the US Army include the older M123 6×6 and the M915 6×4 and M920 8×6 vehicles, the latter two being virtually standard commercial chassis with the absolute minimum of modifications to suit them for military use.



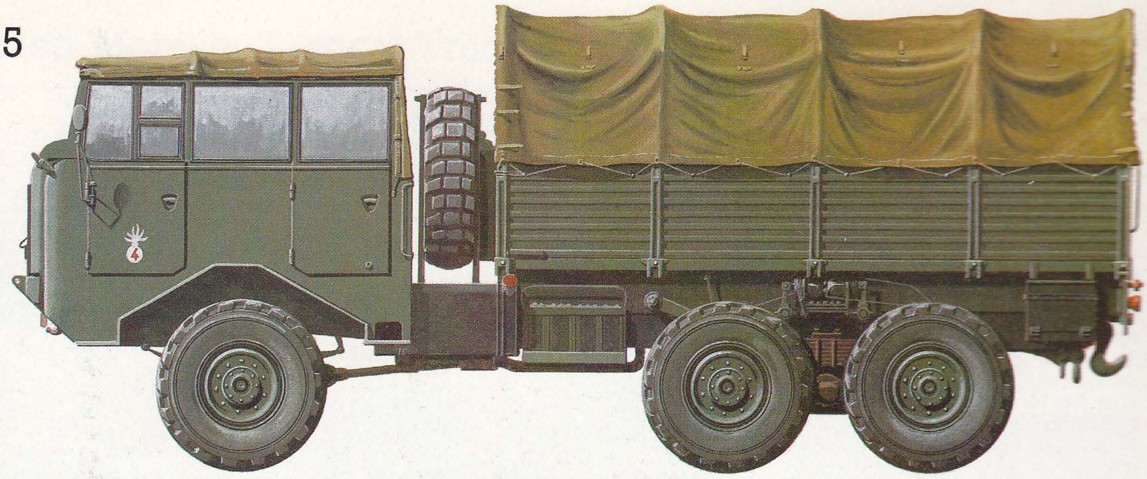
Above: A MAZ-537 (8×8) tows a ChMZAP-5212 heavy flatbed trailer carrying a T-55 MBT with long-range fuel tanks and an unditching beam at the rear. This trailer has a total of eight wheels, with powered loading ramps being fitted as standard. The tractor truck has a central tyre pressure system.



Right: A Ward LaFrance M746 (8×8) Tractor Truck (or Heavy Equipment Transporter, as it is officially called) tows an M747 semi-trailer carrying an M60 series MBT. A total of 125 of these vehicles were delivered to the US Army between 1975 and 1977, and a further 68 were sold to Morocco.

FRANCE

Berliet GBU 15



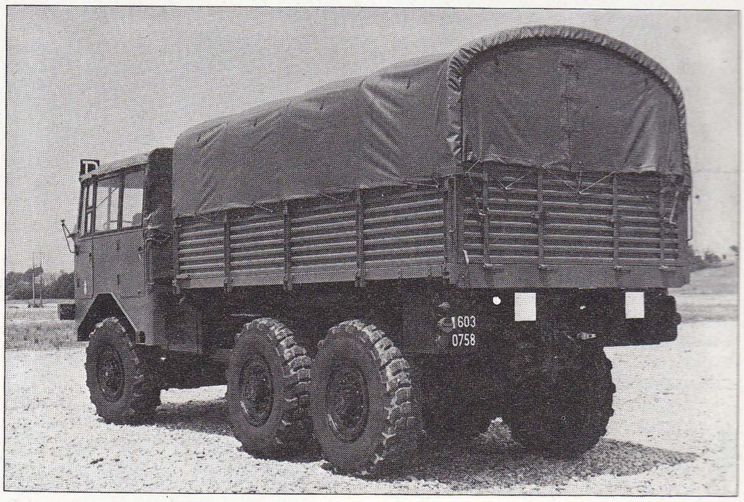
Above:* *The Berliet GBU (6×6) truck was developed from the T-6 truck and entered service with the French army in 1959. Variants include an 155-mm artillery tractor, tanker, tipper, tractor truck for towing semi-trailers and a recovery vehicle called the TBU 15 CLD.

For the last 25 years the **Berliet GBU 15** 6×6 truck has been the standard heavy truck of the French army, but from 1985 will be slowly supplemented by the Renault TRM 10000 6×6 truck which has a much greater payload. The latter was developed by Renault from the TRM 9000 6×6 truck which was developed by Berliet as the GBD. For some years Berliet and Saviem, the main manufacturers of trucks for the French army, have been part of Renault Véhicules Industriels, which today offers a complete range of cross-country vehicles including the TRM 2000, TRM 4000 (previously the Saviem SM8), TRM 6000 (previously the Berliet GBD), TRM 9000, TRM 10000 and the TRM 12000; TRM stands for Toutes Roues Motrices, while the numerical suffix is the cross-country payload in kilogrammes.

The Berliet GBU 15 truck has a cross-country payload of 6000 kg (13,228 lb) and a road payload of 10000 kg (22,046 lb), and can tow a trailer or weapon with a maximum weight of 15000 kg (33,069 lb). The engine is under the four-door forward cab, which has a removable top and windscreen that can be folded forwards. The engine can run on a variety of fuels (including paraffin, fuel-oil and petrol) and is coupled to a manual gearbox with five forward and one reverse gear and a two-speed transfer case. Steering is power-assisted on the front wheels, and the suspension (front and rear) consists of longitudinal springs.

The rear cargo area is of all-steel construction and has drop tailgate, removable sides, bows and a tarpaulin cover. Standard equipment includes a winch with a capacity of 8000 kg (17,637 lb).

The artillery tractor version has ammunition racks in the rear, and is used by the French army to tow the old 155-mm Modèle 1950 howitzer, which is now being replaced by the new GIAT 155-mm TR howitzer towed by a modified TRM 10000 truck. The tractor truck is called the **TBU 15** and tows a semi-trailer which can carry various tracked and wheeled vehicles and engineer equipment up to a maximum weight of 20500 kg (45,195 lb). The recovery version is called the **TBU 15 CLD** (Camion Lourd de Dépannage): mounted on its rear is a hydraulically-operated crane with a telescopic jib, while located at the front of the vehicle is a winch with a capacity of 5000 kg (11,023 lb) which can be increased to 7000 kg (15,432 lb) with the earth anchors in use. The rear-mounted winch has a maximum capacity of 8000 kg (17,637 lb) which can be increased to 12000 kg (26,455 lb) with earth anchors. As with most recovery vehicles of this type, a full range of tools, plus cutting and welding equipment, is carried. Other variants of the GBU 15 include dump trucks and a tanker.



A Berliet GBU 15, seen from the rear, shows its cargo area with drop sides and tailgate, removable bows and tarpaulin cover. Mounted under the rear of the truck is a winch with a capacity of 8000 kg (17,637 lb), which can be used for self-recovery or to recover other vehicles.

Specification

Berliet GBU 15

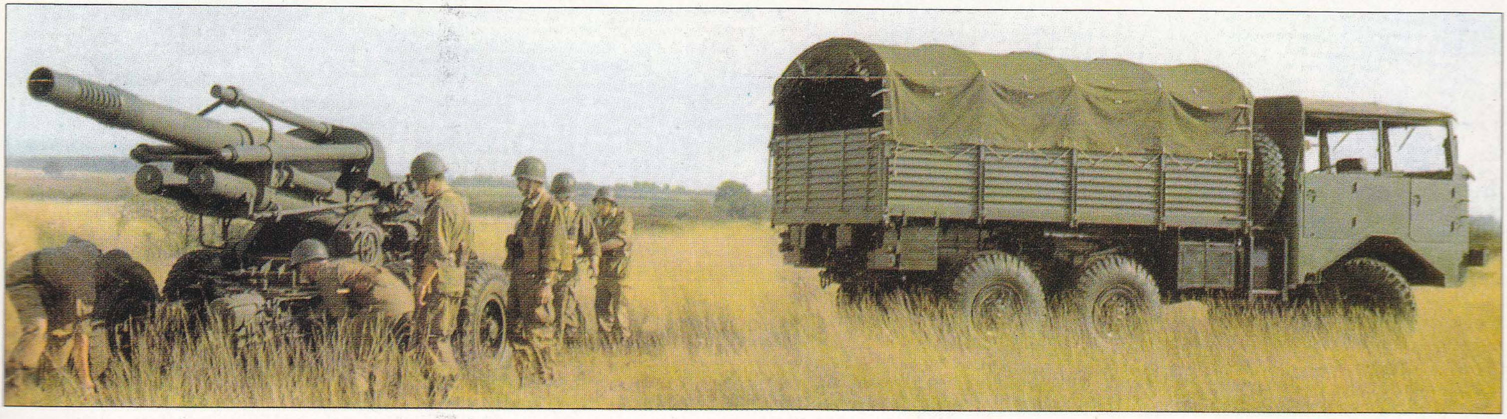
Crew: 1+3

Weights: empty 14500 kg (31,967 lb); loaded 20500 kg (45,195 lb)

Powerplant: one Berliet 6-cylinder multi-fuel engine developing 159.6 kW (214 hp)

Dimensions: length 7.974 m (26 ft 1.9 in); width 2.50 m (8 ft 2.4 in); height (cab) 3.00 m (9 ft 10.1 in)

Performance: maximum road speed 75 km/h (46.6 mph); maximum range 800 km (497 miles); fording 1.0 m (3 ft 3 in); gradient 60 per cent; side slope 30 per cent



The Berliet GBU 15 is used to tow the 155-mm Model 1950 howitzer in French army service. Both the truck and the Model 1950 are now being replaced by the new Renault TRM 10000 and the 155-mm TR towed gun, which has a much longer range.

FRANCE

Renault TRM 10000

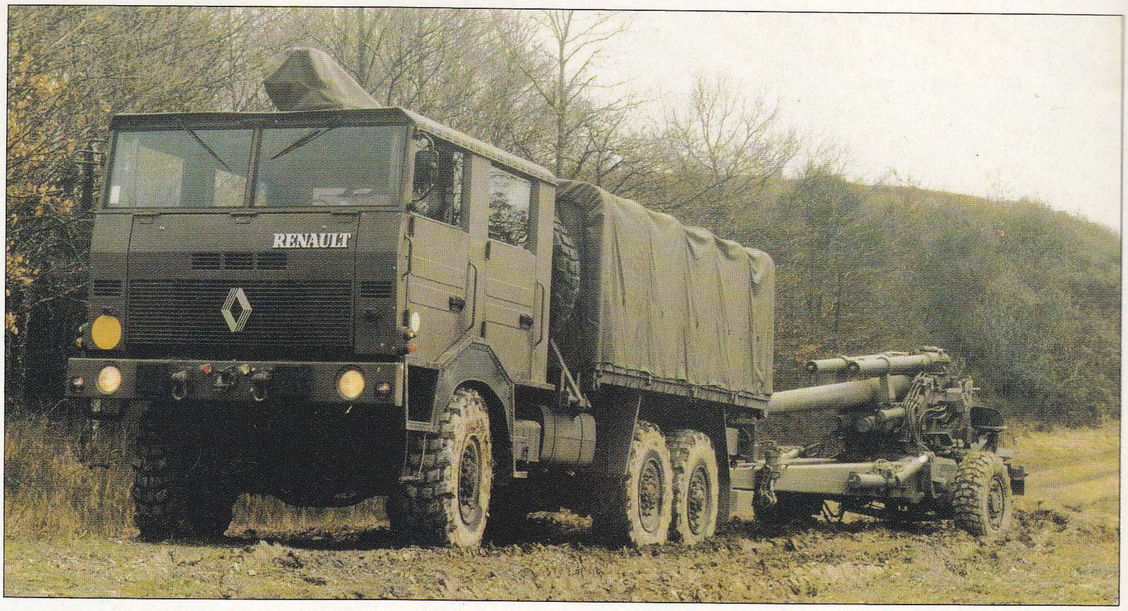
For many years the standard heavy cargo truck of the French army has been the Berliet GBU 15 6×6 6000-kg (13,228-lb) vehicle. This is now being replaced by the new **Renault TRM 10000** 6×6 cargo truck which can carry across country a nominal load of 10000 kg (22,046 lb), although its actual maximum capacity is 12480 kg (27,514 lb). The TRM 10000 is a further development of the **Renault TRM 9000** 6×6 truck, which was originally developed as the **Berliet GBD** and entered production in 1975. The TRM 9000 was not selected by the French army although some 3,000 vehicles were exported, the largest operators being Algeria (500) and Morocco (1,500).

The TRM 10000 is essentially the TRM 9000 but with slightly increased carrying capacity, a longer wheelbase, a more powerful engine and a different transmission. First production TRM 10000s were completed by Renault in 1984, and the total French army requirement is understood to be 5,000 vehicles, all of which are to be delivered by 1994, although delivery could well be stretched out and the order reduced for the usual budgetary considerations.

The basic TRM 10000 truck has a forward control cab with seats for the driver and one passenger. The cab can be tilted forward to allow access to the engine for routine maintenance work. The engine is coupled to a manual gearbox with nine forward and one reverse gear and a transfer box. To reduce driver fatigue power steering is fitted as standard. The rear cargo area has removable sides, a tailgate, bows and a tarpaulin cover, and can be fitted with seats to enable 24 fully equipped infantrymen to be carried.

As with most military vehicles today, the TRM 10000 can be fitted with a very wide range of optional equipment to suit different operator requirements, including a long-range fuel tank, special hooks and couplings, a winch, an automatic gearbox, a four-door cab, a 12.7-mm (0.5-in) anti-aircraft machine-gun mount, a trailer braking device and so on.

The French army has already selected the TRM 10000 to tow its new 155-mm (6.1-in) TR howitzer, this model being fitted with the four-door cab and a hydraulic crane on the rear body for lifting ammunition. Other variants could include a tanker, a dump truck, a tractor truck (4×4 rather than 6×6) and a missile resupply vehicle.

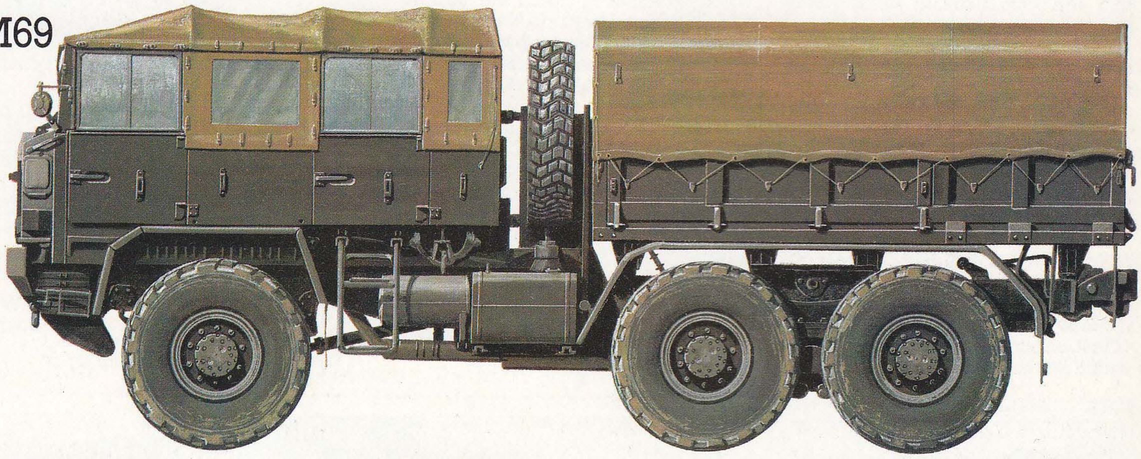


Specification
Renault TRM 10000
Crew: 1+1
Weights: empty 12000 kg (26,455 lb); loaded 22000 kg (48,502 lb)
Powerplant: one Renault MIDS 06.20-45 6-cylinder diesel developing 193.9 kW (260 hp)
Dimensions: length 9.46 m (31 ft 0.4 in); width 2.48 m (8 ft 1.6 in); height (cab) 3.06 m (10 ft 0.5 in)
Performance: maximum road speed 89 km/h (55 mph); maximum road range 1200 km (746 miles); fording 1.0 m (3 ft 3 in); gradient 60 per cent; side slope 30 per cent

This Renault TRM 10000 has a four-door cab, used to carry the crew and ammunition and tow the new French 155-mm TR gun. Mounted on the cab roof is a 12.7-mm M2 HB anti-aircraft machine-gun. This vehicle also has an onboard hydraulic crane for loading and unloading ammunition.

ITALY

FIAT 6605 TM69



Since World War II the Italian army has used a mix of self-propelled and towed artillery weapons for both logistical and economic reasons. In the 1960s the FIAT company built prototypes of both light and medium artillery tractors, the latter being called the **FIAT model 5505** or **TM65** (TM standing for Trattore Medio). Further development of the TM65, including the replacement of the original petrol engine by a more efficient diesel engine, resulted in the **FIAT Model 6605** or **TM69**, which was subsequently adopted by the Italian army to tow heavy artillery such as the 155-mm (6.1-in) FH-70 howitzer.

The TM69 has a forward control cab that extends back to the centre of the vehicle, and this cab has seats for the driver and complete gun detachment. The cab has a heater, removable roof and side screens, and the windscreen can be folded forwards. The rear area had drop sides and a drop tailgate, removable bows and a tarpaulin cover. The cargo area is divided into three sections: the first is used for charges, the second for projectiles and the third for general stores. Standard equipment includes a winch with a capacity of 10000 kg (22,046 lb) which can be used to the front or rear. The engine is coupled to a manual gearbox with eight forward and one reverse gear and a two-speed transfer case. Steering is power-assisted on the front wheels.

The TM69 can carry a maximum payload of 5000 kg (11,023 lb) and tow a trailer or weapon weighing up to 15000 kg (33,069 lb). The **FIAT 6605 FH** is almost identical to the TM69, but has a slightly shorter rear cargo area because to the rear of the cab is mounted a hydraulic crane for unloading pallets of ammunition.

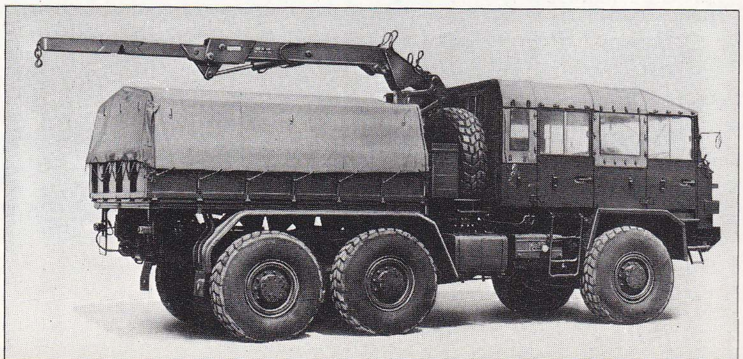
The **FIAT 6605 A** is one of the more recent members of the series, and has been designed specifically for carrying 7600 kg (16,755 lb) of cargo across country. It is the TM69 with a two-man cab and a rear cargo body with a drop tailgate, troop seats down each side, removable bows and a tarpaulin cover.

The recovery version is called the **FIAT 6605 AG**, and has a two-man cab with a turntable-mounted crane at the rear; this crane has a telescopic jib that can lift a maximum load of 5000 kg (11,023 lb). To steady the vehicle while lifting operations are being carried out two stabilizers are normally lowered to the ground on each side. The FIAT 6605 AG is fitted with two winches: the front unit has a capacity of 9200 kg (20,283 lb) while the rear winch has a capacity of 20000 kg (44,092 lb). In addition to being used by the Italian army, the FIAT 6605 series has been exported to Libya and Somalia.

Specification
Fiat 6605 TM69
Crew: 1+11
Weights: empty 11860 kg (26,147 lb); loaded 17000 kg (37,479 lb)
Powerplant: one FIAT Model 8212.02.500 6-cylinder diesel developing 163.3 kW (219 hp)
Dimensions: length 7.33 m (24 ft 0.6 in); width 2.50 m (8 ft 2.4 in); height (cab) 2.92 m (9 ft 7.0 in)
Performance: maximum road speed 78 km/h (48 mph); maximum range 700 km (435 miles); fording 1.5 m (4 ft 11 in); gradient 60 per cent; side slope 20 per cent

The FIAT 6605 TM69 is used to tow 155-mm FH-70 field howitzers while carrying the complete gun crew, ammunition and essential supplies. Variants include the FIAT 6605 AG recovery vehicle and the 6605 A cargo truck.

FIAT 6605 FH has a hydraulic crane mounted to the immediate rear of the 11-man cab, and is used to unload pallets of ammunition. Mounted at the rear of the truck is a winch with a capacity of 10000 kg (22,046 lb) and 60 m (186.85 ft) of 18-mm diameter cable.



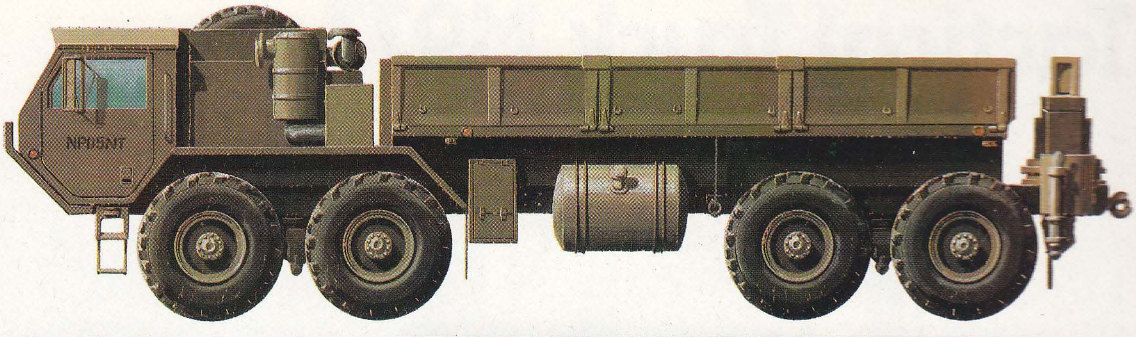
USA

Heavy Expanded Mobility Tactical Truck

For many years the M520 Goer 4×4 vehicle was the largest tactical support vehicle in the US Army's transport fleet, but only 812 of these were built between 1972 and 1976. The US Army tested prototypes of 8×8 cross-country cargo trucks built by the American Pacific Car and Foundry Company and MAN of West Germany, but none of these were procured for use in the cargo role, though the MAN truck was selected as the prime mover for the Ground-Launched Cruise Missile (GLCM) and Pershing 2 surface-to-surface missiles that are now operational in Europe.

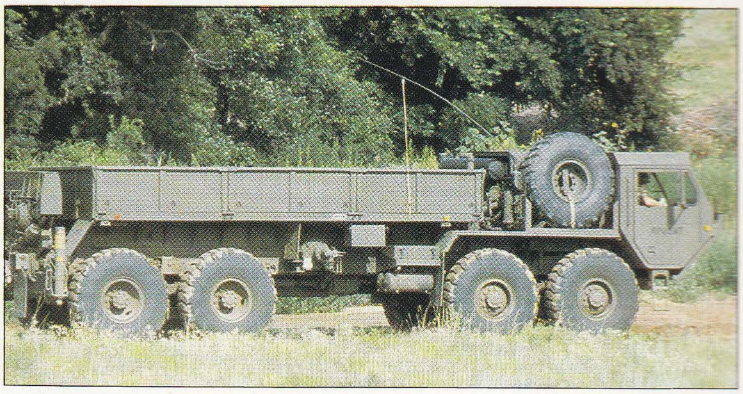
The US Army then issued a requirement for a **Heavy Expanded Mobility Tactical Truck** (**HEMTT**), and after studying a number of proposals awarded the Oshkosh Truck Corporation a $251 million five-year contract for the supply of 2,140 vehicles with production options for a further 5,350 vehicles. The first production trucks were completed in 1982, but problems were soon encountered as the HEMTT had been ordered into production before the prototypes had been fully subjected to the normal exhaustive military trials. Most of these problems have now been overcome, and the vehicle is now in service with the US Army within the continental United States as well as in West Germany and South Korea. The HEMTT has a nominal payload of 10 US tons.

To keep down both operating and procurement costs, many of the automotive components of the HEMTT are standard proven commercial parts: for example the cab, engine and transmission are also used in the Oshkosh Mk 48 series 8×8 articulated vehicle currently in production for the US Marine Corps as the **Logistic Vehicle System** (**LVS**).



Above: The US Army is now taking delivery of over 5,000 of these Oshkosh Heavy Expanded Mobility Tactical Trucks (HEMTT) over a five-year period. This is the basic M977 cargo truck, which has drop sides, a self-recovery winch and a material handling crane for unloading.

The basic cargo model of the Heavy Expanded Mobility Tactical Truck is the **M977** and has a rear cargo body with drop sides, a light crane, and a winch that can be used to the front or rear of the vehicle. The tanker model is the **M978** while the tractor truck is the **M983**. The latter has a fifth wheel for towing semi-trailers and has a material handling crane; if required, a winch can also be installed though in this case the crane is not installed. To support the Multiple Launch Rocket System the **M985** cargo truck is used, this being similar to the basic M977 apart from the heavy-duty crane at the rear. The recovery version is the **M984**, and this has a cargo platform between the second and third axles to carry engines and other spare parts, a hydraulic crane over the third axle, and a central winch that can be used to the front or rear.

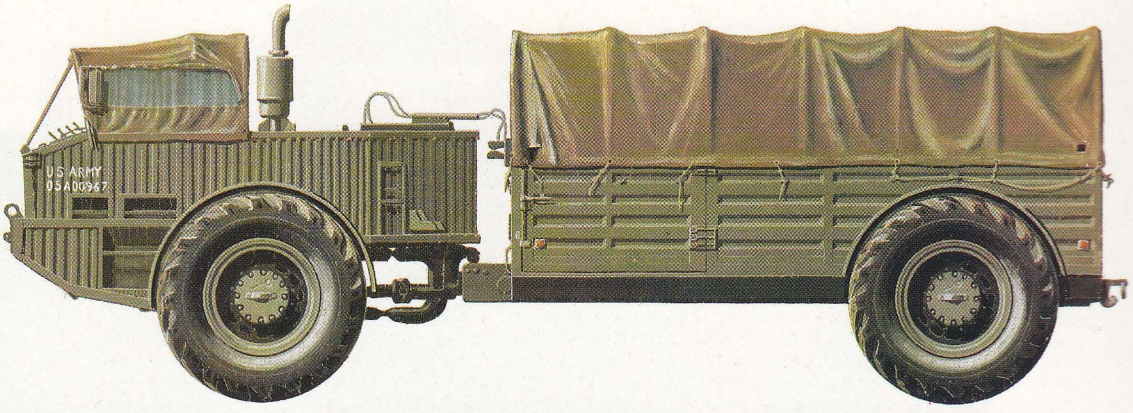


Wherever possible, standard civilian automotive components have been used in the design of the Oshkosh M977 family of Heavy Expanded Mobility Tactical Trucks. Other variants include the M978 tanker, M983 tractor truck, M984 wrecker and the M985 cargo truck, with a heavy-duty crane.

Specification
HEMTT
Crew: 1+1
Weights: empty 15825 kg (34,888 lb); loaded 28123 kg (62,000 lb)
Powerplant: one Detroit Diesel Model 8V-92TA V-8 diesel developing 331.8 kW (445 hp)
Dimensions: length 10.16 m (33 ft 4 in); width 2.39 m (7 ft 10 in); height (cab) 2.565 m (8 ft 5 in)
Performance: maximum road speed 88 km/h (55 mph); maximum range 483 km (300 miles); fording 1.524 m (5 ft 0 in); gradient 60 per cent; side slope 30 per cent

USA

M520 GOER



For many years the civil construction industry has used large 4×4 vehicles which have excellent cross-country mobility. In the mid-1950s the US Army also became interested in the use of these vehicles for a variety of battlefield roles. A number of companies built prototypes of vehicles to meet military requirements in both 5- and 15-ton classes. It was then decided to concentrate on an 8-ton vehicle and the Caterpillar Tractor Company of Peoria was awarded a contract to build prototypes of a cargo truck with a nominal payload of 8 tons. Following successful trials with these vehicles in Alaska, Panama and the continental USA, prototypes were also built of a tanker and a recovery vehicle, or wrecker as the US Army calls this type of vehicle. In 1963 Caterpillar was awarded another contract for the supply of a further 13 cargo trucks, two recovery vehicles and eight tankers. These were delivered in 1964 and following trials in Europe were stored there. In 1966 a number of the **GOER** vehicles were deployed to South Vietnam, where they demonstrated their excellent cross-country mobility, especially in the rainy season where normal 6×6 trucks had limited mobility.

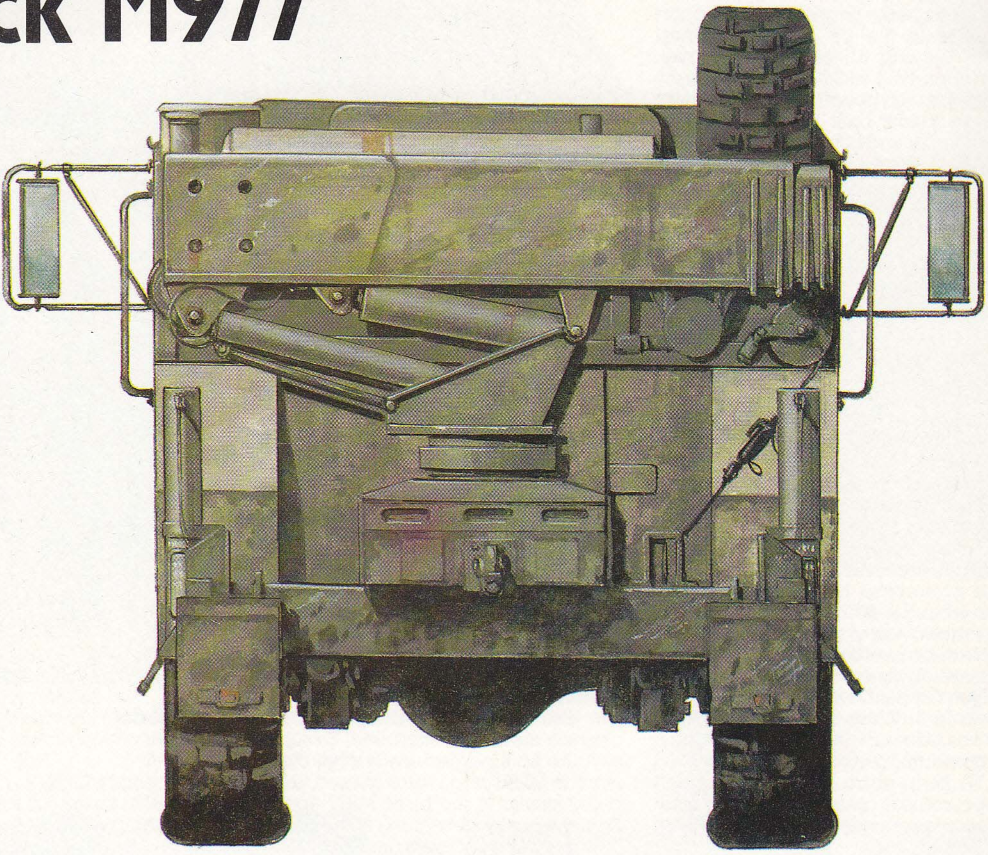
As the GOERs established such an excellent reputation in Vietnam, the US Army decided to issue the vehicle on a much wider scale, and in 1971 Caterpillar was awarded a contract for the supply of 812 **M520** cargo trucks, 117 **M553** wrecker vehicles and 371 **M559** tankers, all of which were delivered by 1976. Until the recent introduction of the Oshkosh Heavy Expanded Mobility Tactical Truck (HEMTT), the GOER was the largest vehicle in the US Army's tactical transport fleet.

The basic M520 cargo vehicle can carry a maximum payload of 8260 kg (18,210 lb) across country and tow a trailer weighing a maximum of 9070 kg (19,996 lb). The vehicle, which is fully amphibious, consists of two units, front and rear, which are connected by an articulated joint that allows lateral movement of 20° and a steering angle of 60°. The front unit contains the open-topped crew compartment, engine and transmission, while the rear compartment is the load area which has side and rear doors to facilitate the rapid loading and unloading of cargo. Mounted at the front of the vehicle is a winch with a capacity of 4536 kg (10,000 lb), and some vehicles have been fitted with a hydraulic crane for loading and unloading cargo. An unusual feature of the GOER series is that it has no suspension as such, the large 18.00×33 tyres absorbing the shock.

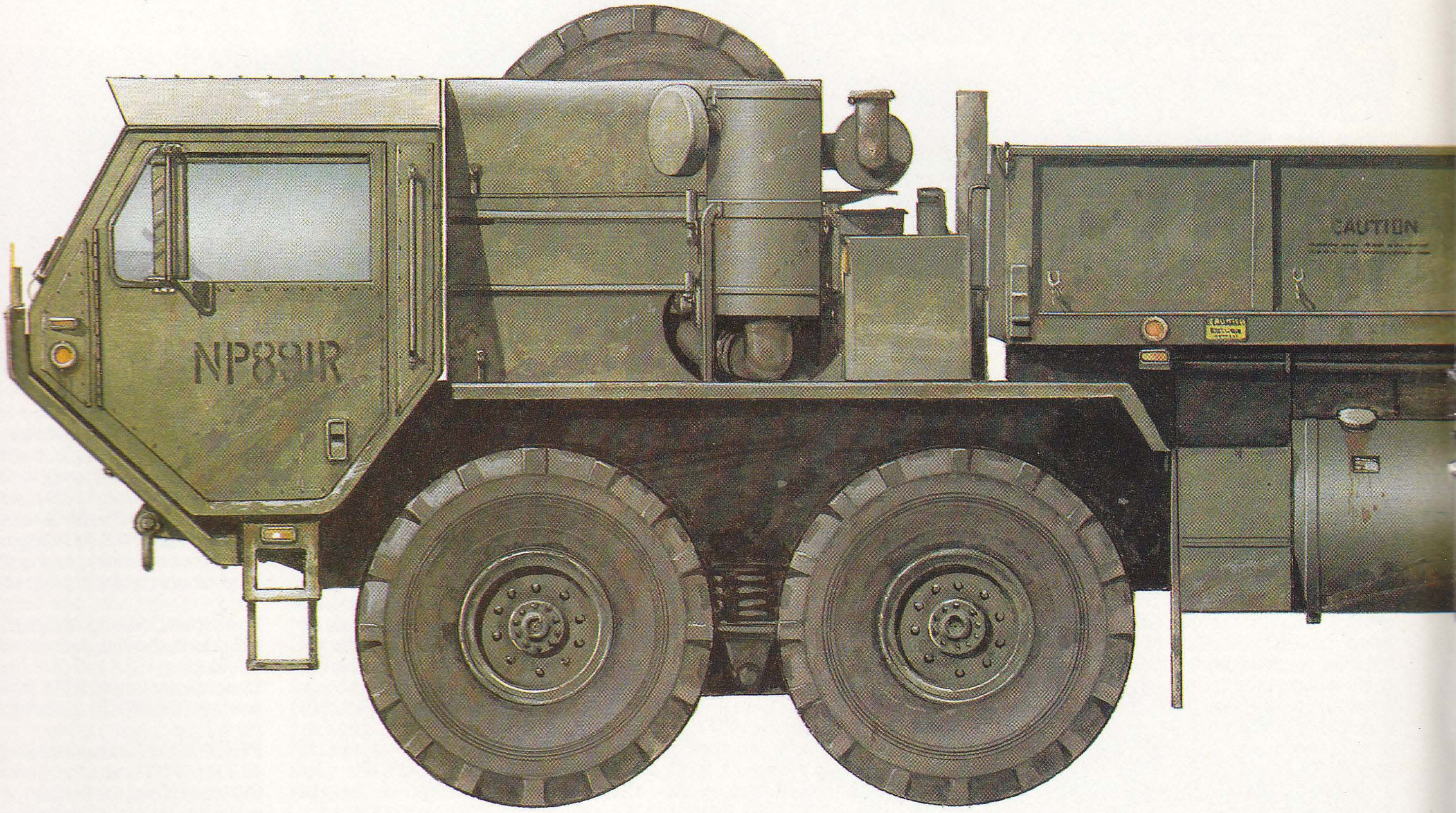
Between 1972 and 1976, the Caterpillar Tractor Co. delivered 812 GOER M520 (4×4) cargo trucks to the US Army, and most of these remain in service today. The M520 can carry 8260 kg (18,210 lb) of cargo on roads and across country, and is also fully amphibious without preparation.

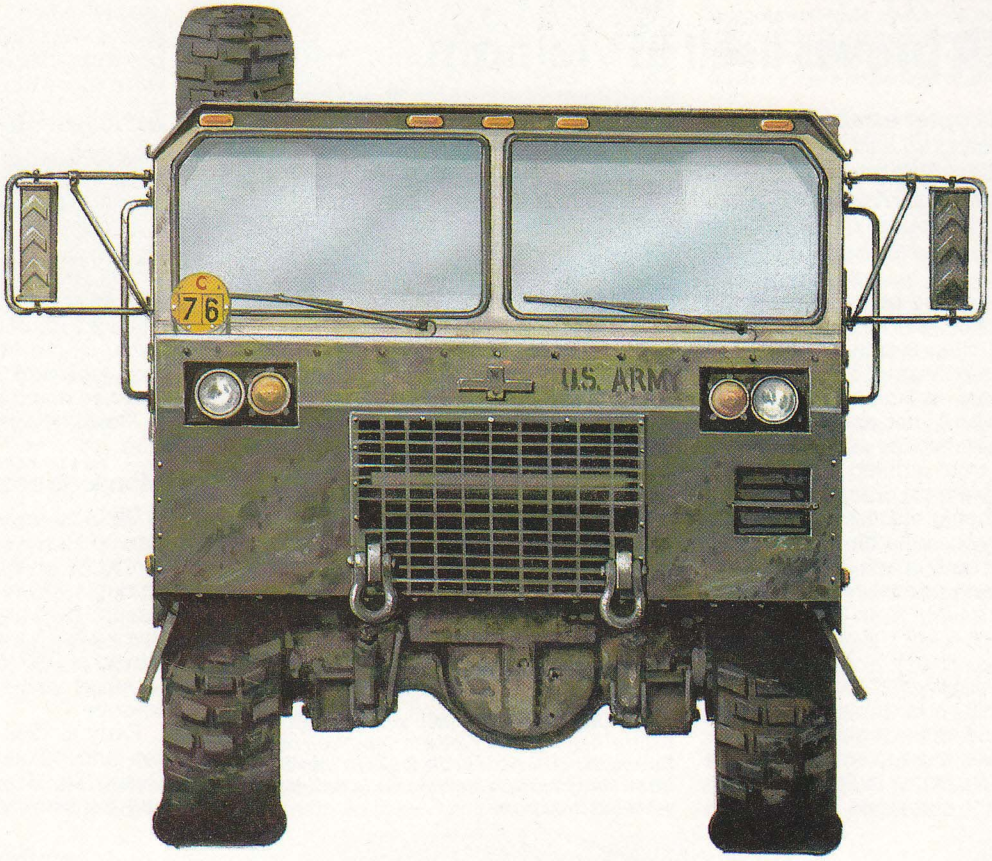
Specification
M520
Crew: 1+1
Weights: empty 10240 kg (22,575 lb); loaded 18500 kg (40,785 lb)
Powerplant: one Caterpillar D333 6-cylinder turbocharged diesel developing 158.8 kW (213 hp)
Dimensions: length 9.753 m (32 ft 0 in); width 2.743 m (9 ft 0 in); height 3.404 m (11 ft 2 in)
Performance: maximum road speed 48.3 km/h (30 mph); maximum range 660 km (410 miles); fording amphibious; gradient 60 per cent; side slope 30 per cent

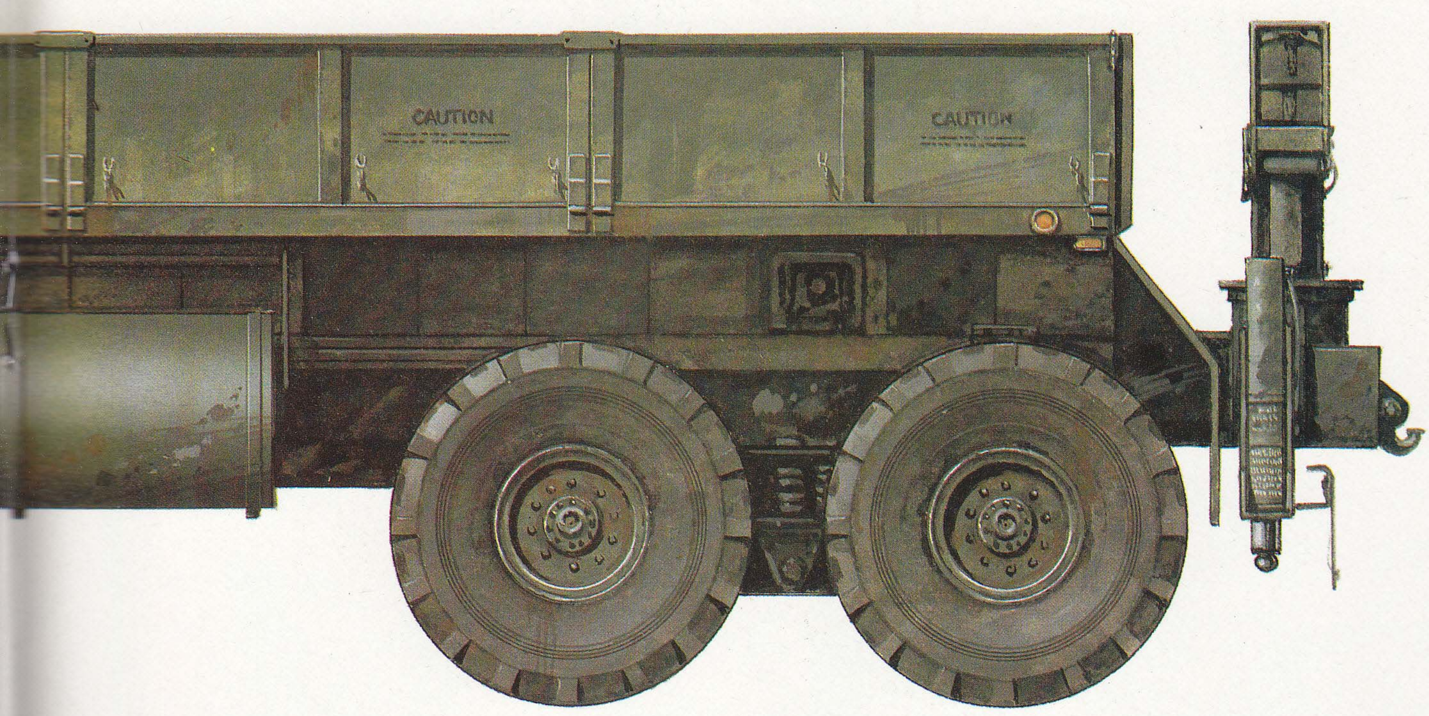
Oshkosh Heavy Expanded Mobility Tactical Truck M977



The US Army has ordered over 2,000 examples of the Oshkosh HEMTT; tanker, tractor and wrecker versions will supplement the basic M977 cargo truck shown here. To minimize procurement and operating costs, the HEMTT design makes extensive use of available commercial automotive parts, including the Detroit Diesel V-8 12-litre engine and the four-speed automatic transmission. The two-man cab, a standard Oshkosh model, is of heavy-duty welded steel construction with corrosion-resistant skin, and features suspension seats, dual sun visors, variable-speed windscreen wipers and electric air horns. The M977 weighs 15.8 tonnes (15.6 tons) empty and up to 28 tonnes (27.5 tons) when loaded.




C
76
U.S. ARMY


CAUTION
CAUTION

High Mobility

The GOER proves itself in Vietnam

Although the helicopter established itself as a military transport in Vietnam, the vast majority of supplies still had to be moved by truck. The mountainous, forested terrain of South East Asia was difficult enough for wheeled vehicles without the monsoon rains which arrived every April to turn dirt roads into impassable quagmires. To move cargo through areas where the ordinary 6×6 trucks could not go, the US Army turned to the GOER.

It is often thought that the helicopter was the sole means of transporting ammunition, fuel, rations, troops and other essential supplies in South Vietnam. The helicopter did play a key role in South Vietnam, but the vast majority of cargo was handled by 2.5-ton and 5-ton trucks, and by tractor trucks hauling semi-trailers.

Urgent supplies were airlifted from the USA to South Vietnam, but most of the cargo came by sea, and after being offloaded from ships was transported by truck farther inland. Such was the shortage of dock space that the Americans had to build new ports to handle the vast amounts of cargo.

Truck convoys

Unloaded cargo usually went to depots from which individual units and camps could draw their supplies as and when required. Wherever possible supplies were moved in convoys of trucks as on many routes in South Vietnam there were constant ambushes by the Vietcong. Armoured vehicles and mine-clearing teams swept ahead of the convoy, while helicopter gunships patrolled overhead with ground-attack aircraft on call if they should be needed.

Road conditions ranged from good to non-existent, with major problems encountered in the monsoon season when many roads were turned into deep mud that proved impassable to conventional 6×6 cargo trucks.

In 1960 Caterpillar Tractor was awarded a contract by the US Army for the design and development of the GOER 4×4 cargo vehicle. After trials with prototype vehicles, in 1963 Caterpillar was awarded a contract for a further 13 cargo trucks, eight fuel tankers and two recovery vehicles, or wreckers as the type is usually called by the US Army. These were sent to West Germany for extensive troop trials but when these were completed the GOERs were placed in store.

Arrival in Vietnam

In 1966 it was decided to send these vehicles to South Vietnam not only for further trials, but also to assist in moving fuel and ammunition in forward areas where conventional trucks were finding the going difficult.

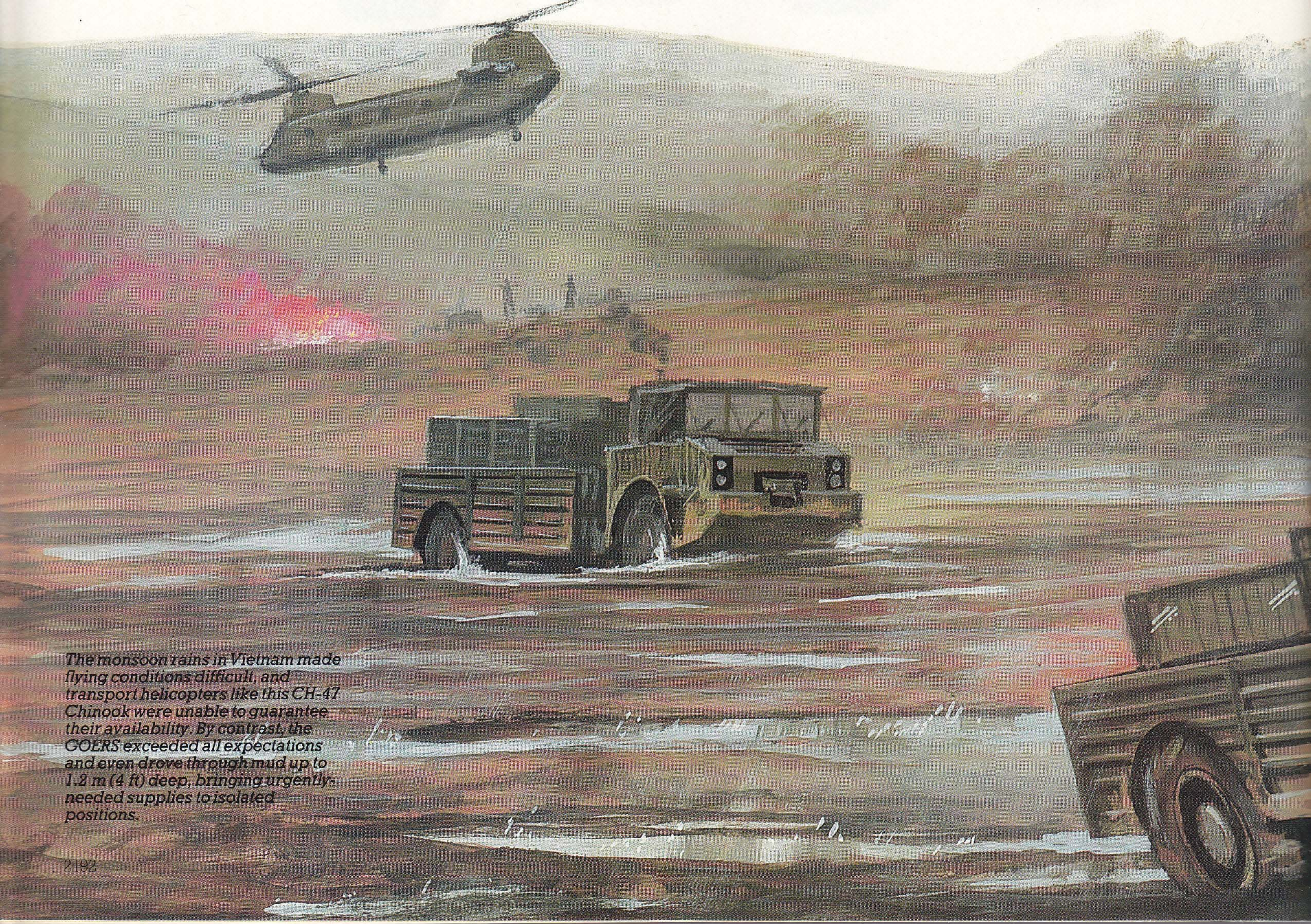
The first two GOERs were sent by sea and arrived at the US-built port of Cam Ranh Bay in August 1966, and were initially used to move cargo off the beaches and shift it inland. The rest of the vehicles arrived in September of the same year and first went to Qui Nhon and then to Pleiku, to operate with the 4th Infantry Division.

Monsoon conditions

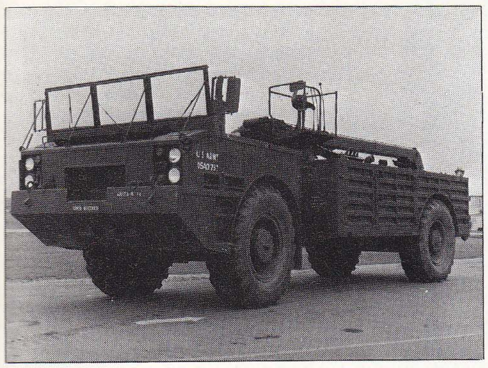
Within a very short period the GOERs had proved their worth over conventional 6×6 cargo trucks as they could operate in areas impassable to normal vehicles, even in getting through mud up to 1.22 m (4 ft) deep. After two successful monsoon seasons, the GOERs were moved in 1967 to Chu Lai to keep forward units supplied with essential supplies in the rainy season.

Early in 1968 the GOERs were shipped by sea and offloaded onto the beach south of Quang Tri. Here they operated in deep sand and transported fuel and ammunition off the

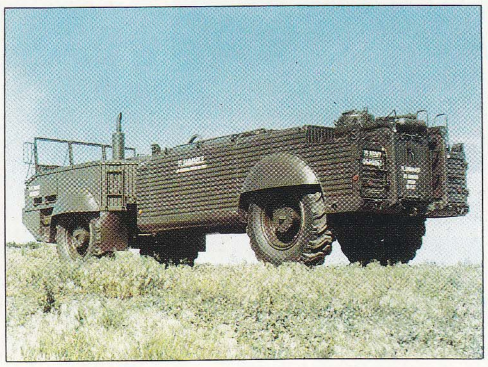
Two GOER trucks fight their way through the central highlands of Vietnam. Monsoon rains turned the dirt roads in the II Corps tactical zone into a sticky morass impassable to ordinary wheeled transports.



The monsoon rains in Vietnam made flying conditions difficult, and transport helicopters like this CH-47 Chinook were unable to guarantee their availability. By contrast, the GOERS exceeded all expectations and even drove through mud up to 1.2 m (4 ft) deep, bringing urgently-needed supplies to isolated positions.



The GOER had been widely tested and sent to join US forces in West Germany before it was deployed to Vietnam. Nineteen GOERs were so deployed; vehicle availability was impressive, and they proved themselves able to tackle almost any terrain.



The basic cargo model of the GOER was soon supplemented by specialist versions such as this fuel tanker. In Vietnam the GOER proved the value of high mobility wheeled transport and today the US Army has a large fleet of all-terrain trucks.

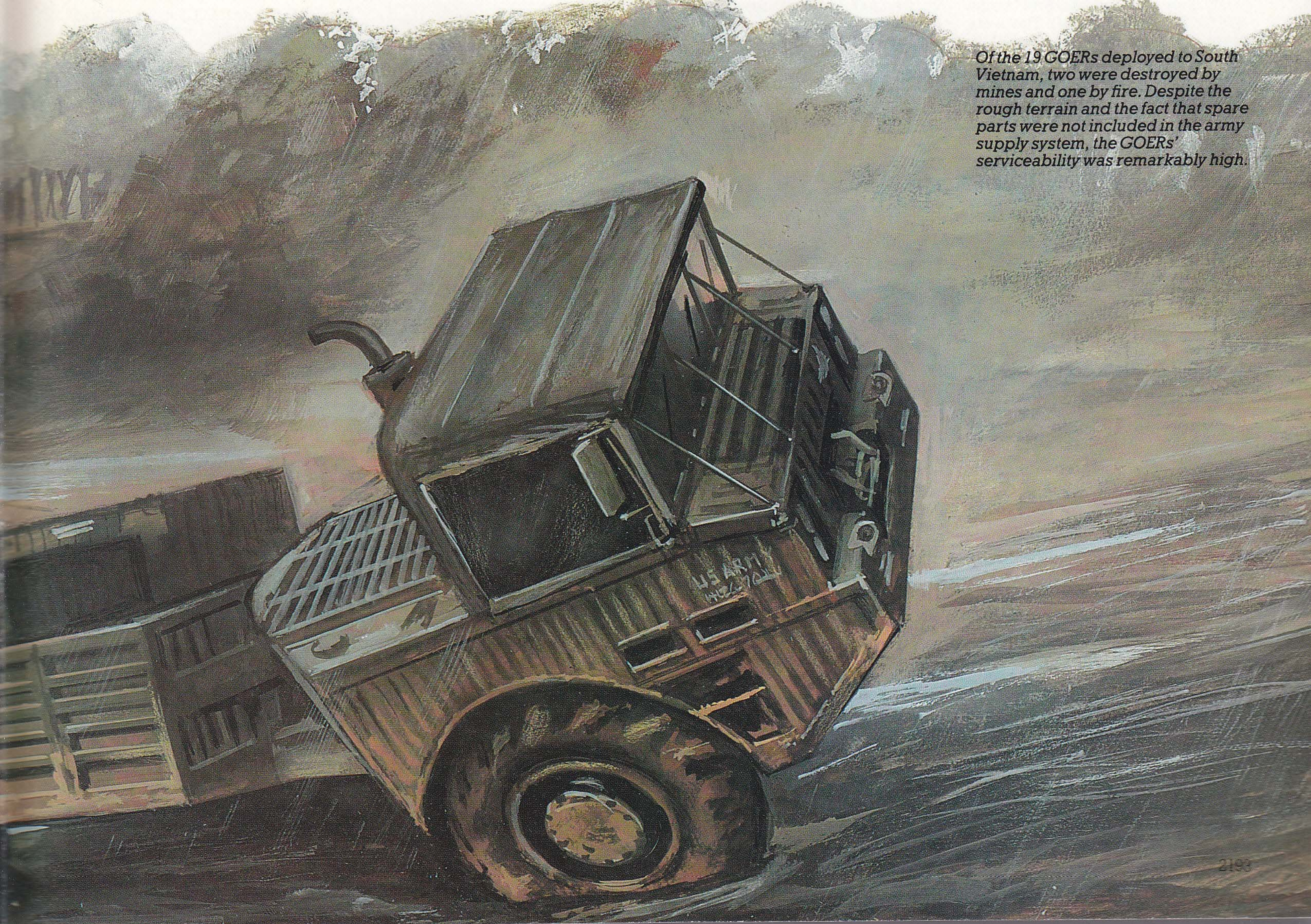
beach direct to the units that needed them. In addition they were used to recover other vehicles that had become bogged down in the deep sand. Once the road network around the beach area had been established, there was little need for the GOERs and they were transferred back to Pleiku in the highlands, where their capabilities were more urgently needed.

Success

With their articulated bodies, large tyres, good ground clearance and all-wheel drive, GOERs more than proved their worth in South Vietnam. During their first 18 months of operations, the GOERs moved over 8,930 tons of cargo and 6435200 litres (1,700,000 US gal) of fuel over a distance of 254275 km (158,000 miles). Nineteen GOERs were deployed to South Vietnam, one being destroyed by fire and two by mines. Of 6,329 vehicle operating days available, only 809 were lost to vehicle unserviceability. This represented a vehicle availability rate of just over 87 per cent which, when it is taken into account that the vehicles were operating in the roughest terrain available, was a first-class performance. The GOERs were also several years old before they even went to South Vietnam, and had been used for extensive troop trials in West Germany. It should also be remembered that the GOER was not at that time in large-scale use as only a few had been built for trials, so there were no spare parts for the vehicles in the army supply system. Spare parts for the GOERs had to be ordered and sent by air from the USA via the Red Ball System.

In addition to hauling supplies and other essential stores from the supply dumps to isolated camps and fire bases, the GOERs were also used to deliver ammunition direct to the batteries in the field as normal vehicles could not get through. On many occasions ammunition was unloaded from the GOERs, unpacked and used by the guns within minutes. The M559 refueller version was used to refuel tanks, armoured personnel carriers and helicopters in forward areas as normal refuellers could not get through.

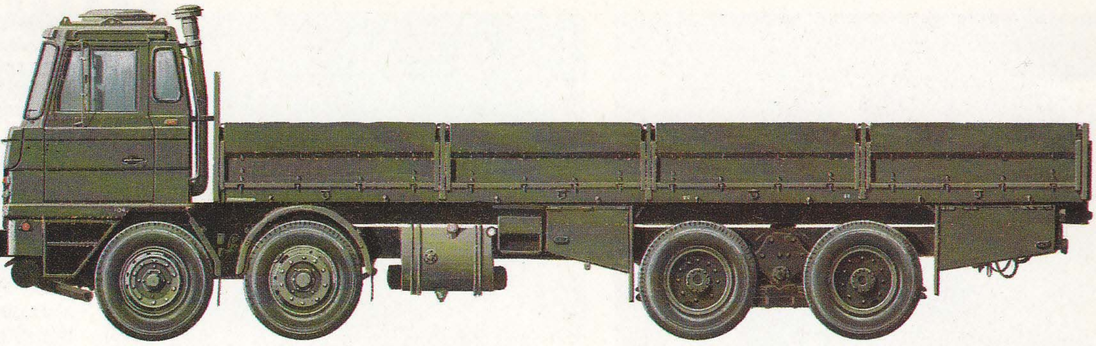
The GOER concept was proved in South Vietnam and in May 1971 Caterpillar Tractor was awarded a US Army contract for the supply of 812 M520 cargo trucks, 117 M553 wreckers and 371 M559 tankers, all of which were delivered by mid-1976. Until the recent introduction of the 8×8 Oshkosh Heavy Expanded Mobility Tactical Truck, the GOER has been the only vehicle in the US Army tactical transport fleet capable of supplying forward units with the ammunition, fuel and other essential supplies that they need to carry out their function. Within NATO at least, there are now vehicles with the capability of the GOER.



Of the 19 GOERs deployed to South Vietnam, two were destroyed by mines and one by fire. Despite the rough terrain and the fact that spare parts were not included in the army supply system, the GOERs' serviceability was remarkably high.

UK

Foden 8×4 Low-Mobility Truck



Above: A Foden (8×8) low-mobility truck of the British army, which now has 800 of these in service. The rear cargo body is fitted with removable drop sides and a tailgate, and can carry a maximum load of 20000 kg (44,092 lb), although in army service maximum load is normally limited to 16000 kg (35,274 lb).

The British army today operates three main classes of military trucks: low mobility, medium mobility and high mobility. There is only one vehicle in the last class, the 6×6 Alvis Stalwart High Mobility Load Carrier. The medium mobility vehicles are represented by the Bedford Mk 4×4 and TM 4-4 4×4 trucks with payloads of 4000 kg (8,818 lb) and 8000 kg (17,637 lb) respectively. The low-mobility fleet consists of over 1,200 **Foden** trucks in 8×4 and 6×4 configurations, these being essentially standard civil vehicles with military bodies and the minimum of modifications to suit them for military use such as military paint, an observation hatch in the roof of the cab, military lighting, a towing eye at the front, a pulling jaw at the rear and recovery lugs at front and rear.

The most common model is the 8×4 cargo truck, which is fitted with a Marshall of Cambridge rear body with drop sides, a drop tailgate, removable bows and a tarpaulin cover. This can carry a maximum payload of 20000 kg (44,092 lb), although in regular use this is limited to 16000 kg (35,274 lb). A special version with a larger cab is used for driver training. In the British Army of the Rhine these low-mobility trucks typically carry cargo from the Channel ports into West Germany, where their load is transferred to all-wheel-drive trucks with their superior cross-country mobility.

Two tanker versions are in service, the 8×4 model carrying 22500 litres (4,949 Imp gal) and the 6×4 model 12000 litres (2,640 Imp gal). These are normally used to carry fuel from dumps in the rear to the battlefield, where they transfer their loads to fuel farms or to cross-country tankers (for example Bedford Mk 4×4 trucks) which refuel the vehicles in the field.

The Royal Engineers have 70 8×4 models in the tipper configuration for general construction work.

All members of the Foden low-mobility range are powered by the same Rolls-Royce engine coupled to a Fuller transmission with nine forward and one reverse gear. Steering is power-assisted on the front two axles in the 8×4 model and on the front axle in the 6×4 model.

The Foden 8×4 model has also been fitted with the French Bennes Marrel Ampliroll system, which can be used for a variety of roles: the rear body can be swapped according to mission requirements, for example carrying cargo and containers, or serving as a fuel tanker or tipper. Some of these in 6×4 configuration have been sold to Zambia and are used to carry Scorpion CVR(T) vehicles.

Specification

Foden LMT

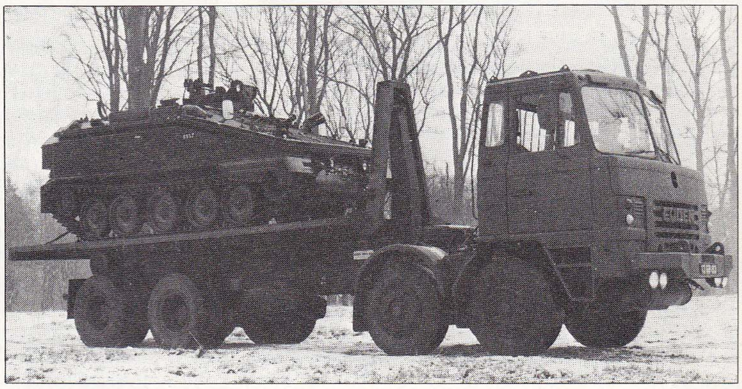
Crew: 1+2

Weights: empty 11000 kg (24,251 lb); loaded 27000 kg (59,525 lb)

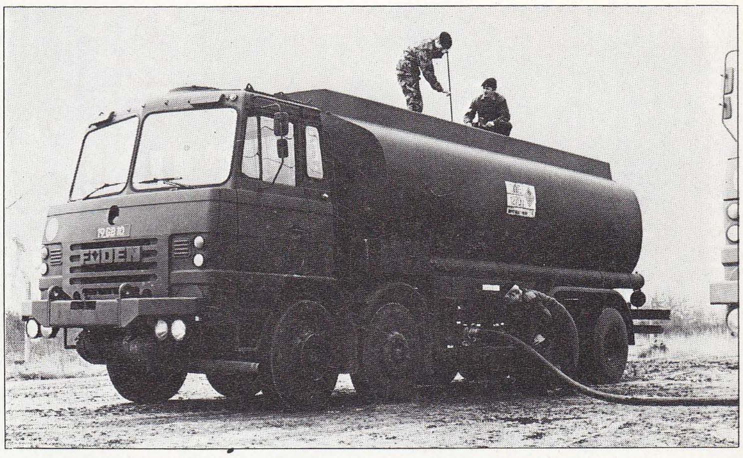
Powerplant: one Rolls-Royce 220 Mk 111 6-cylinder diesel developing 164.1 kW (220 bhp)

Dimensions: length 10.287 m (33 ft 9 in); width 2.489 m (8 ft 2 in); height 3.327 m (10ft 11 in)

Performance: maximum road speed 76 km/h (47 mph); maximum road range 499 km (310 miles); fording 0.914 m (3 ft 0 in); gradient 31 per cent; side slope 20 per cent



This Foden (8×8) low-mobility truck is fitted with an Ampliroll system carrying an Alvis Spartan armoured personnel carrier. This flat bed can be quickly offloaded from the vehicle without any external assistance and exchanged for a wide range of other bodies such as a tanker, cargo or dump truck.



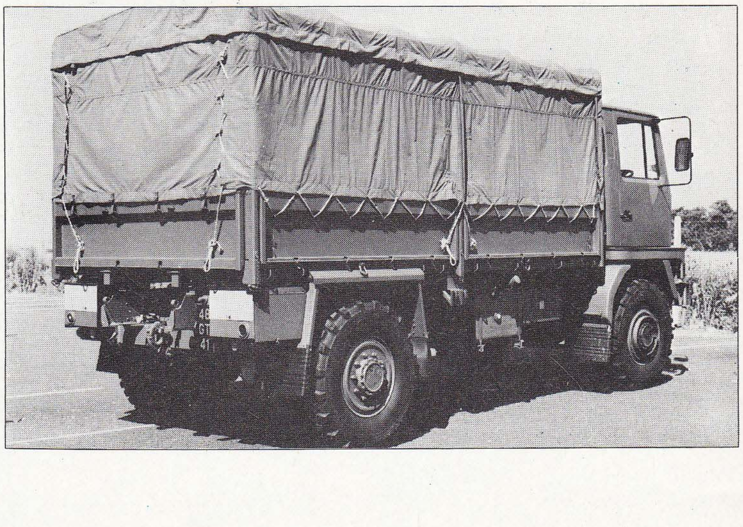
A Foden (8×8) low-mobility tanker of the British Army. A total of 218 of these vehicles were delivered, and are fitted with a 22500 litre (4950 Imp gal) tank-body that has five compartments. Many of these Foden low-mobility vehicles have left-hand drive for use in West Germany.

UK

Bedford TM 4-4

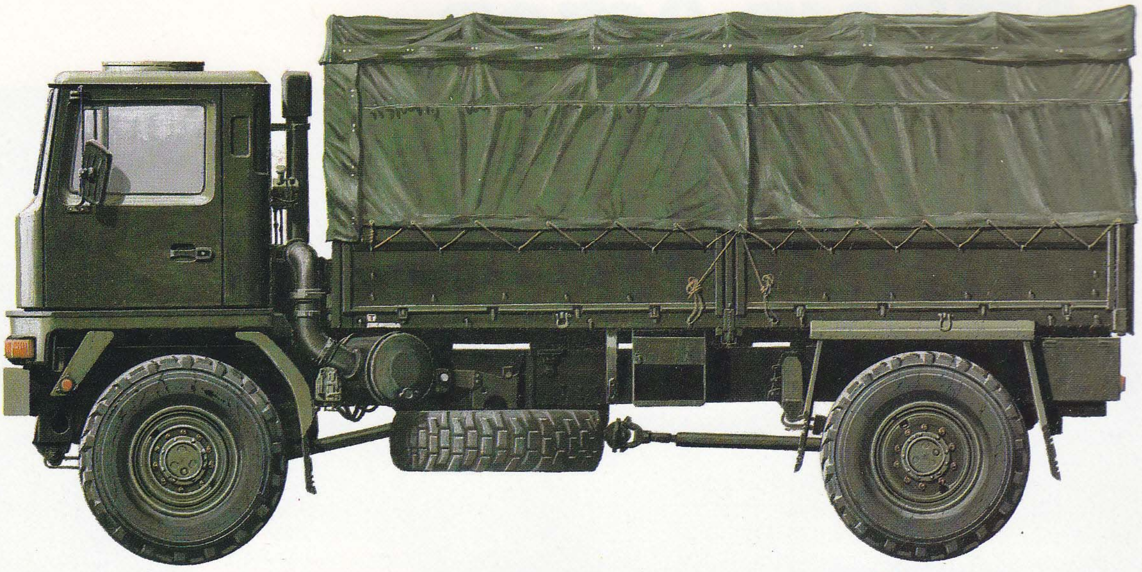
For many years the British army relied on the Bedford 4000-kg (8,818-lb) and AEC Militant 10000-kg (22,046-lb) trucks to meet its cargo-carrying requirements, although the Alvis Stalwart High Mobility Load Carrier (HMLC) 6×6 truck is also used in some numbers, mainly to support armoured and artillery units with fuel and ammunition. As part of its Medium Mobility Vehicle Programme, a requirement was issued for a new 4×4 8000-kg (17,637-lb) truck to be based on a proven commercial chassis. After exhaustive trials with prototype vehicles submitted by Foden, Leyland and Bedford, the last's offering was selected by the British army and in 1977 the company was awarded a contract worth about £40 million for the supply of 2,099 trucks. The first of these were delivered to the British army in 1981. The **Bedford TM 4-4** is based on the commercial TM range of 4×2 trucks which has been in production for a number of years.

The TM 4-4 can carry a maximum payload of 8000 kg (17,637 lb) across country and tow a trailer or weapon weighing a maximum of 10000 kg (22,046 lb). The vehicle has a two-man forward control cab of all-steel construction which can be tilted forwards



The Bedford TM 4-4 has a Marshall of Cambridge rear cargo body with a wooden floor, removable drop sideboards and tailboard, removable bows and a tarpaulin cover. It can carry 8000 kg (17,637 kg) of cargo on road and across country.

Bedford TN 4-4 (continued)



Since 1981 the British Army has taken delivery of over 2000 Bedford TM 4-4 trucks in four models: basic cargo, cargo with winch, cargo with Atlas hydraulic crane, and tipper. This is essentially a commercial vehicle modified to meet military requirements.

to an angle of 60° to allow access to the engine for maintenance purposes. There is an observation hatch in the roof on which a 7.62-mm (0.3-in) machine-gun can be installed for anti-aircraft defence. The engine is coupled to a manual gearbox with six forward and one reverse gear and a two-speed transfer box. Suspension (front and rear) consists of semi-elliptical springs with double-acting telescopic shock absorbers. Steering is power-assisted on the front wheels.

Bedford builds only the chassis, the rear cargo body being provided by Marshall of Cambridge. This body has removable sides and tailgate, folding bench seats and removable bows and a tarpaulin cover. The British army originally ordered 1,330 of this basic cargo version. A further 300 TM 4-4s were supplied with an 8000-kg (17,637-lb) mid-mounted winch for self-recovery or recovering other vehicles, while another 300 have been fitted with an Atlas crane to the rear of the cab to assist in loading and unloading the vehicle. The British army also has 169 TM 4-4s fitted with an Edbro dump body which tips to the rear; this model has a shorter wheelbase than the normal cargo version.

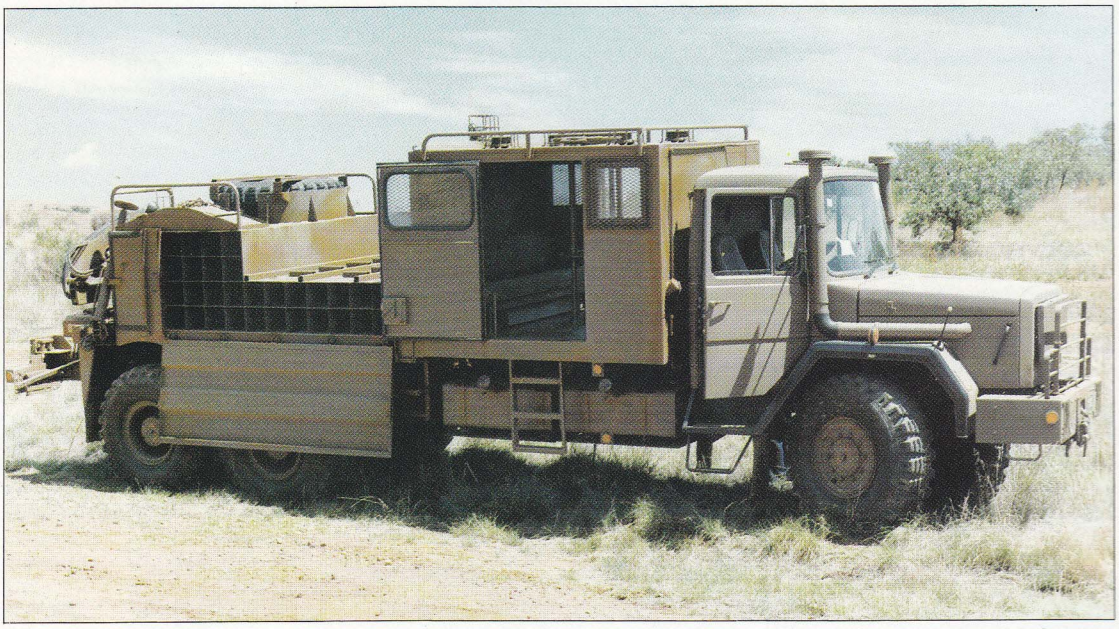
In addition to being used by the British army, the TM 4-4 has also been sold to a number of other armies including those of Abu Dhabi, Bahrain and Oman. Bedford offers a wide range of options for this vehicle, including an exhaust brake, transfer box differential, modified electrics and so on, and specialized versions such as a tanker and fuel resupply vehicle. Currently being tested by the British army is a 6×6 version called the **TM 6-6**, which has a payload of 14000 kg (30,865 lb).

Specification
Bedford TM 4-4
Crew: 1+1
Weights: empty 8300 kg (18,298 lb); loaded 16300 kg (35,935 lb)
Powerplant: one Bedford turbocharged diesel developing 153.6 kW (206 bhp)
Dimensions: length 6.629 m (21 ft 9 in); width 2.489 m (8 ft 2 in); height (cab) 2.997 m (9 ft 10 in)
Performance: maximum road speed 93 km/h (58 mph); maximum range 499 km (310 miles); fording 0.762 m (2 ft 6 in); gradient 55 per cent; side slope 30 per cent

---

SOUTH AFRICA

SAMIL 100



One of the more specialized versions of the South African SAMIL 100 truck is this gun tractor used to tow the ARMSCOR 155-mm G5 howitzer. In addition to carrying the gun crew, it also carries projectiles, fuses and essential supplies. A hydraulic crane is fitted.

To meet the demanding requirements of the South African Defence Forces (SADF) a complete range of cross-country vehicles has been developed and put into service under the name **SAMIL** (South African Military). The smallest model in the range is the **SAMIL 20** 4×4 with a payload of 2200 kg (4,850 lb), followed by the **SAMIL 50** 4×4 with a payload of 4800 kg (10,582 lb) and the **SAMIL 100** 6×6 with a payload of 10000 kg (22,046 lb). The SAMIL 50 and SAMIL 100 share many components such as the cab, wheels, tyres and so on, which has many advantages to the army as only one lot of spares have to be kept.

The layout of the SAMIL 100 is conventional, with the air-cooled engine and enclosed two-man cab at the front, and the cargo area at the rear. The engine is coupled to a manual gearbox with six forward and one reverse gear and a two-speed transfer case. There is power-assisted steering on the front wheels. As roads are nonexistent in many of the areas in which the South African army is expected to operate, special attention has been given to the design of the chassis and suspension, the latter consisting of leaf springs and telescopic hydraulic shock absorbers.

The basic cargo model has drop sides and a drop tailgate, and can carry a maximum of 10000 kg (22,046 lb) of cargo across roads, and tow a trailer or weapon weighing a maximum of 10000 kg (22,046 lb). To enable cargo to be loaded quickly a hydraulic crane is mounted to the rear of the cab; this crane has a maximum payload of 1000 kg (2,205 lb), and before it is used two hydraulic stabilizers are lowered to the ground.

As usual there are a number of variants of the SAMIL 100, in addition to the mine-protected vehicles described elsewhere. These include a rear-tipping dump truck, a fuel tanker, a water tanker, a recovery vehicle and an artillery tractor. The last has been developed to tow the old British 139.7-mm (5.5-in) medium gun or the ARMSCOR 155-mm (6.1-in) G-5 long-range gun, which is considered by many to be the best weapon of its type in the world. To the rear of the standard three-man cab of the SAMIL 100 artillery tractor is a fully-enclosed cab for eight gunners, and a 7.62-mm (0.3-in) machine-gun is mounted on the roof of the cab for both anti-aircraft and local defence. To the rear of this cab are the stowed propellant charges (access to these being obtained by lowering the drop sides) with the pallets of 155-mm ammunition carried on top. To facilitate the rapid unloading of ammunition at the gun position, a hydraulic crane is mounted at the rear of the truck: this can lift a maximum load of 800 kg (1,764 lb). As the SAMIL 100 artillery tractor is expected to operate in the bush, standard equipment includes a front-mounted winch and a heavy-duty brush guard for the front of the vehicle.

Specification
SAMIL 100
Crew: 1+2
Weights: empty 11000 kg (24,251 lb); loaded 21000 kg (46,297 lb)
Powerplant: one V-10 diesel developing 199.8 kW (268 hp)
Dimensions: length 10.27 m (33 ft 8.3 in); width 2.50 m (8 ft 2.4 in); height 3.35 m (11 ft 0 in)
Performance: maximum road speed 88 km/h (55 mph); maximum road range 800 km (497 miles); fording 1.2 m (3 ft 11 in); gradient 70 per cent; side slope 25 per cent

SAMILs in Action

The SAMIL range of trucks is specifically designed to operate in a combat zone. The South African Defence Force maintains substantial garrisons in Namibia that must be supplied over long distances vulnerable to guerrilla operations. Many models of SAMIL truck are therefore armoured and structured so as to minimize the damage done by land mines.

In many counter-insurgency operations since World War II, the single most deadly weapon of the terrorist has been the land mine. This can be anything from an anti-tank mine buried under the surface of the road to a large amount of explosive placed under a bridge or culvert and detonated from a safe distance by the terrorists. In some cases a security vehicle running over a mine is the start of an ambush, but more often than not the terrorists have long since departed when the mine is detonated.

New vehicles developed

The South African army suffered a number of casualties in South West Africa (or Namibia) as a result of mines exploding under trucks, and undertook a detailed examination of not only the types of mine involved but, more important, how the design of their vehicles could be improved to minimize casualties.

To meet the requirements of the South African Defence Forces (SADF) the SAMIL (South African Military) range of 4×4 and 6×6 trucks have been developed and placed in service. This range includes the SAMIL 20 4×4 vehicle with a cross-country payload of 2200 kg (4,850 lb), the SAMIL 50 4×4 vehicle with cross-country payload of 4800 kg (10,582 lb) and the SAMIL 100 6×6 vehicle with a cross-country payload of 10000 kg (22,046 lb). In each of these series are a number of mine-protected vehicles for use in the border areas.

The protected transport version of the SAMIL 20 has a fully enclosed engine at the front and an enclosed troop compartment at the rear. Bulletproof windows are provided all around the troop compartment, and under each window is a firing port. The bottom of the hull is V-shaped so that when the vehicle runs over a mine the blast is directed upwards and outwards, and not contained underneath the hull. The wheels are at the extreme ends of the vehicle and the installation of a diesel engine not only increases the operational range of the SAMIL but also reduces the danger of fire. The driver and one passenger are seated to the rear of the engine, and five men are seated down each side of the troop compartment facing each other. The protected troop transport is usually known as the Rhino.

The Bulldog armoured personnel carrier is widely used for border patrol work as well as carrying mortar teams operating with the Ratel 6×6 infantry fighting vehicles. Like the Rhino, the Bulldog has a fully enclosed and armoured engine compartment, the driver being seated alone to the rear and at a higher level. To his front and sides are large bulletproof windows to afford good visibility, essential when driving across country. The top of his cab is open, otherwise he would be roasted alive by the heat. The infantry compartment, which has an open roof, is at the rear. The 10 infantrymen sit back to back down the centre, each man being provided with a bucket seat and a full harness. The latter performs two functions: first, if the vehicle is unfortunate enough to hit a mine the troops are not thrown out of the vehicle and second, if they were not strapped in the cross-country speed of the vehicle would have to be reduced. The upper parts of the armoured troop compartment are hinged in the centre and fold down on the outside, but these are heavy to push back again, so most troops tend to climb over the sides. There is also a cargo version of the SAMIL 20 that has a two-man armoured cab but retains the basic cargo area at the rear with drop tailgate, removable bows and a tarpaulin cover.

The SAMIL 50 4×4 trucks are the work-horses of the South African army, and are used to carry cargo rather than troops. There is at least one armoured member of the SAMIL 50 family, the mine-resistant ambulance nicknamed the Kwevoel. This has a fully armoured engine compartment and two-man cab at the front, while at the rear is a fully enclosed and armoured body that can carry four stretcher and six seated patients. Bulletproof windows and firing ports are provided in the rear part, and entry to this is effected through two doors at the rear which are opened pneumatically from the driver's cab or outside. The lower part of the vehicle has the usual V-shape to provide maximum protection against mines, and as the rear ambulance area is so high above the ground a special ramp is provided to enable stretcher parties to walk up the ramp and into the vehicle as quickly as possible. When this is not required the ramp is lifted into the horizontal position to slide under the ambulance area so providing additional protection against mines. As well as the medical equipment carried, the SAMIL 50 mine-resistant ambulance also has an intercom between the driver's cab and the rear.

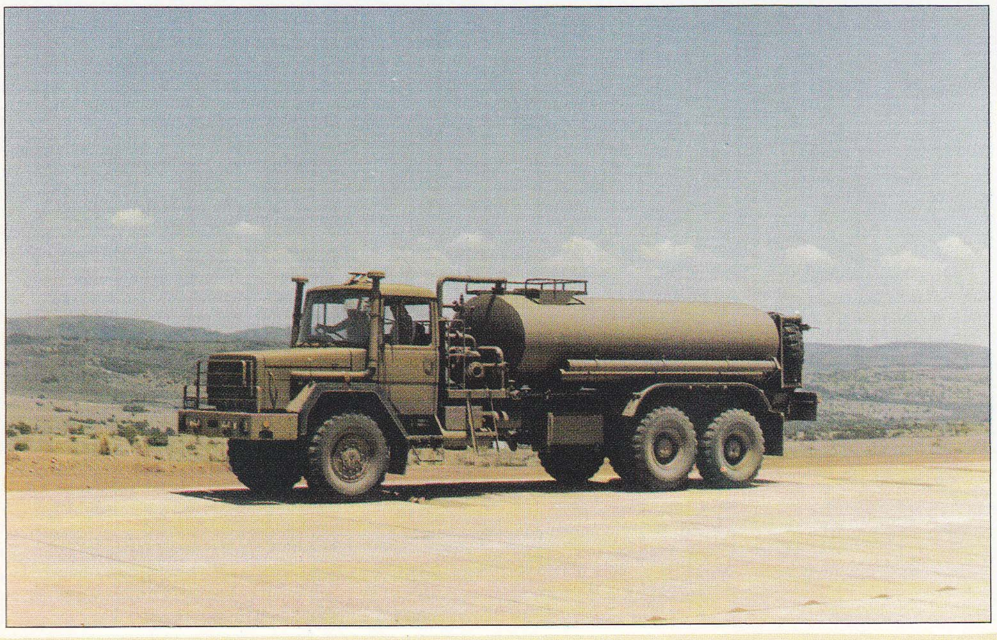
The largest member of the SAMIL family is the SAMIL 100. As well as the normal cargo variants there is also a gun tractor for the South African-designed G5 towed howitzer, a rear tipping dump truck, a recovery vehicle with protected cab, a fuel tanker and a water tanker. There are at least two armoured versions of the SAMIL 100, namely the basic 10000-kg (22,046-lb) cargo truck with an armoured engine compartment and a fully enclosed two-man armoured cab, and the protected transport with a fully enclosed rear troop compartment.

The design, development and production of the mine-protected vehicles has reduced the casualty toll in the South African army, but as other defence forces have found out, for example the British army in Northern Ireland, if the terrorist puts enough explosive under the ground no amount of armour protection will save the crew. In Northern Ireland even Saracen 6×6 fully armoured personnel carriers have been completely wrecked by massive bombs.

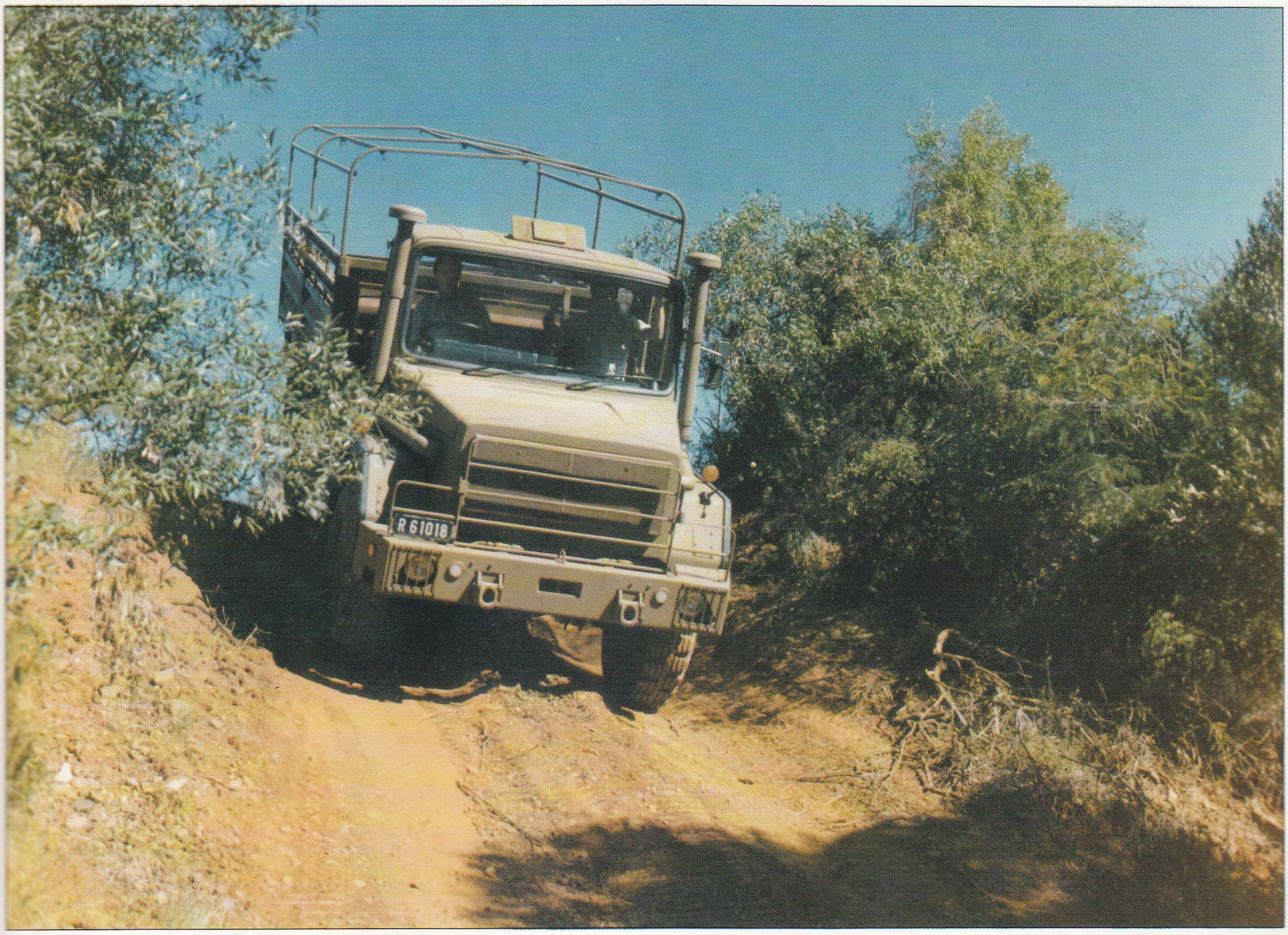
SAMIL trucks in action

The northern border of South West Africa is so long that it is impossible to have every inch constantly watched and patrolled by the South African army. To the south of the border South Africa has established a number of bases (suitably protected against attack) from which patrols of mine-protected vehicles can be sent out. These bases not only contain quarters for the troops but also artillery support (normally old British 139.7-mm/5.5-in guns), extensive communications facilities, logistical back up and often an airstrip as well. Urgent supplies are flown in by air, but as in Vietnam, most of the supplies (such as fuel and ammunition) have to come in by road.

Depending on the threat, which changes according to the time of year, patrols are sent out in the smaller Bulldog armoured personnel carriers. These patrols are on the constant lookout for any signs of enemy activity such as cooking fires, footprints around water holes and known crossing points, and so on. Some of the vehicles carry special trackers who can dismount from the vehicle and track the guerrillas on foot while the Bulldogs follow up to the rear.



The SAMIL 100 6×6 fuel tanker has been designed to refuel trucks and armoured vehicles such as the Ratel in forward areas. The tanker carries a total of 13000 litres (2,860 gal) and is provided with one large and three small hoses to refuel vehicles directly or to fill cans.

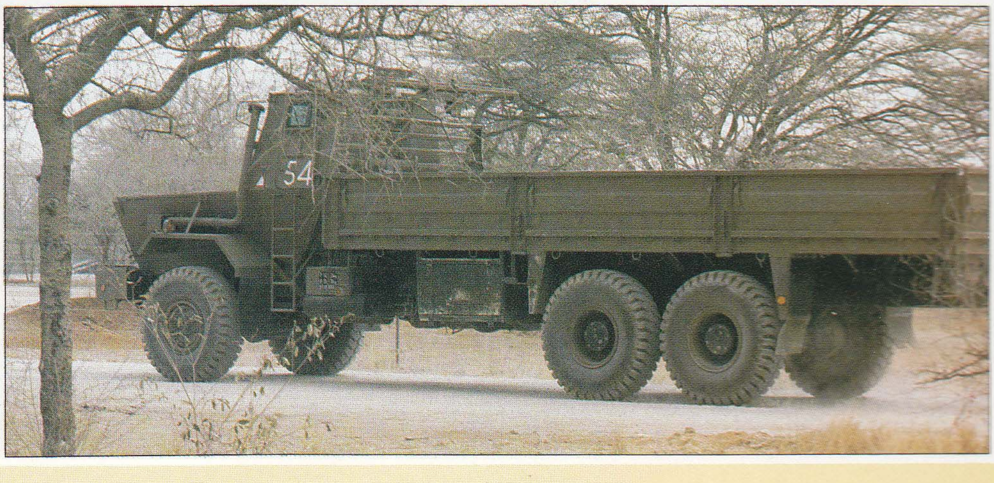


The SAMIL 50 can carry 4800 kg (10,582 lb) of cargo on roads and across country, and has a similar cab and other components to the SAMIL 100 series. Variants include a recovery vehicle, workshops, tanker (water and fuel), and a number of mine-protected vehicles.

When on patrol the troops in the rear of the Bulldog are firmly strapped in their seats and as the vehicle crashes through the bush they are at the mercy of any branches that whiplash across the tops of the vehicles. Another danger is snakes, which like to rest in the tops of the trees, and can fall into the vehicle without warning. As the troop compartment is some way above the ground the troops have a good view across the surrounding terrain. In the event of an ambush they either motor through it as fast as possible or dismount and fight on foot; if the vehicle is disabled they all leave as quickly as possible. Although the armoured sides can be folded down, the men usually climb over the side, which is difficult with full equipment. The heat is unbearable, and within a few hours of sunrise the armour plate of the vehicle is so hot that skin burns on contact with it.

In some parts of South West Africa, or 'The Operational Area' as it is officially called, it is quite safe to travel on tarmac roads, although the driver is on the constant lookout for any change in the road surface that could indicate that a mine has been laid. All too often it is a civil vehicle, such as a bus, that runs over the mine, a high casualty rate resulting. When a convoy is moving forward to a key base, an advance patrol is sent ahead to look for mines and any signs of enemy activity.

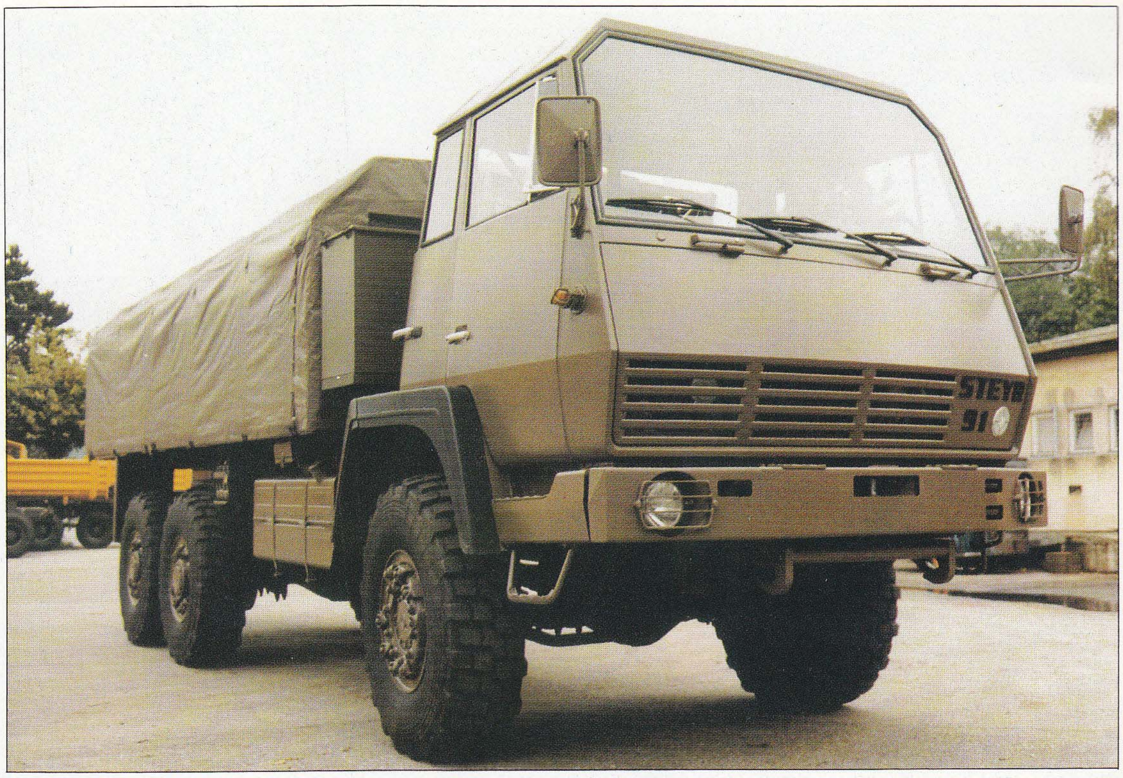
When a large enemy force is encountered, reinforcements are called in by radio. These reinforcements could include more Bulldogs or mechanized troops with their Ratel 6×6 infantry fighting vehicles which are, depending on the version, armed with 90-mm (3.54-in) guns or 20-mm cannon. The Ratels are also usually used for deep-penetration raids into Angola, Bulldogs being used to carry mortars. The main drawbacks of the Bulldog for these long-range missions lies in their inferior cross-country capability, firepower and stowage compared with those of the 6×6 Ratel.



The 'V'-shaped hull of the SAMIL is designed to deflect the blast of a mine upwards and outwards rather than to contain it under the vehicle. The diesel engines not only provide increased operational range but reduce the risk of fire.

AUSTRIA

Steyr 1491 M3



The Steyr 1491 truck is now being built under licence in China, and shares many common components with the Steyr 1291.280 truck, including engine and manual transmission. It can be fitted with a 10000-kg (22,046-lb) winch.

The Austrian company Steyr-Daimler-Puch manufactures a wide variety of military equipment today, including full-tracked armoured fighting vehicles, a complete range of infantry weapons and a whole series of cross-country vehicles. Of the last the most famous is probably the Pinzgauer range of 4×4 and 6×6 vehicles, but more recently the company has developed a 4×4 truck with a cross-country payload of 6000 kg (13,228 lb) and a 6×6 truck with a cross-country payload of 10000 kg (22,046 lb). These share many common and proven components such as engine, transmission, cab, suspension, tyres and wheels.

The 6×6 model is the **Steyr 1491 M3** truck, and can tow a trailer or weapon weighing 15000 kg (33,069 lb) across country or 40000 kg (88,185 lb) on roads. The forward-located fully enclosed cab can be tilted towards the front to allow access to the engine for maintenance purposes, and a circular observation hatch is provided in the roof of the cab. The driver has an adjustable seat, and one or two passenger seats can be installed according to operator requirements. Standard cab equipment includes a heater and ventilator. The rear cargo area is provided with removable drop sides, a drop tailgate, bows and a tarpaulin cover. If required the vehicle can be delivered with a winch of 10000-kg (22,046-lb) capacity and 60 m (197 ft) of cable.

The basic Steyr 1491 M3 6×6 truck is powered by the same Steyr Model WD 615.7 6-cylinder turbocharged diesel developing 218.5 kW (293 hp) as used on the 4×4 model, but as an option this can be replaced by a Steyr WD 815.74 direct-injection turbocharged diesel developing 253.5 kW (340 hp) which gives the much improved power-to-weight ratio that is essential for good cross-country capability. The engine is coupled to a ZF 5 S 111 GP manual gearbox with nine forward and one reverse gears and a two-speed transfer case. Steering is power-assisted on the front axle.

The Austrian army has also purchased over 300 **OAF Type 20.320** 6×6 trucks, which have a cross-country payload of 10000 kg (22,046 lb). This is the West German MAN vehicle used by the West German army at a rating of 7000 kg (15,432 lb). Modifications installed at the request of the Austrian army include an onboard hydraulic crane for loading cargo, and the installation of a more powerful MAN engine in place of the original KHD diesel engine.

Specification

Steyr 1491 M3

Crew: 1+2

Weights: empty 12400 kg (27,337 lb); loaded 22400 kg (49,384 lb)

Powerplant: one Steyr Model WD 615.7 6-cylinder turbocharged diesel developing 218.5 kW (293 hp)

Dimensions: length 8.389 m (27 ft 6.3 in); width 2.50 m (8 ft 2.4 in); height (cab) 3.025 m (9 ft 11.1 in)

Performance: maximum road speed 79.3 km/h (49 mph); maximum range 800 km (497 miles); fording 0.8 m (2 ft 8 in); gradient 60 per cent; side slope 30 per cent

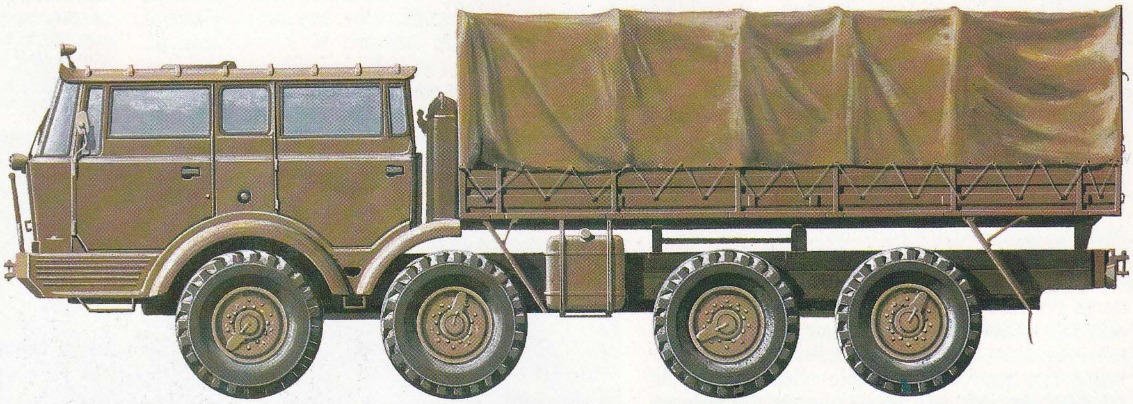
---

CZECHOSLOVAKIA

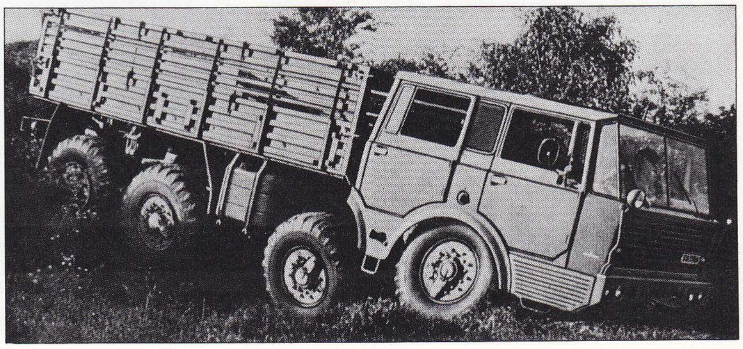
Tatra T 813

The **Tatra T 813** range of vehicles was developed in the 1960s and consists of two prime movers (4×4 and 6×6) and an 8×8 cargo truck which is used for a wide range of civil and military applications. The basic cargo truck can carry a payload of 7900 kg (17,417 lb) or tow a trailer weighing a maximum of 10000 kg (22,046 lb). The four-door fully enclosed cab is at the front of the vehicle with the engine under it, and is unusual in that it is fitted with an NBC system. The engine is coupled to a dual-range five-speed gearbox which gives a total of 20 forward and four reverse gears. Steering is power-assisted on the front four wheels and a central tyre pressure-regulation system is fitted as standard. This latter allows the driver quickly to adjust the tyre pressure to suit the ground being crossed. A winch with a capacity of 22000 kg (48,502 lb) is fitted as standard, and this can be used for self recovery or to recover other vehicles that have become stuck.

The rear cargo body has drop sides, a tailgate, removable bows and a tarpaulin cover, and removable seats. In addition to carrying cargo and troops, the Tatra 813 can also be used to tow artillery such as 122-mm (4.8-in) and



Above: In addition to being used to carry 7900 kg (17,417 lb) of cargo on roads and across country, the vehicle is also widely used as a prime mover for artillery systems and forms the basis for the M1972 122-mm (40-round) multiple rocket launcher.



The Tatra 813 has a fully enclosed seven-man cab that is pressurized and fitted with a ventilation system as standard. All vehicles have a winch with a capacity of 22000 kg (48,502 lb) and some have been fitted with a front-mounted BZ-T hydraulically-operated dozer.

152-mm (6-in) howitzers, and in a wide range of specialized roles. The latter include carrying and launching PMP heavy floating pontoon bridges, carrying and laying into position a scissors bridge, and carrying a portable roadway laying system. The M1972 122-mm multiple rocket system is also mounted on a Tatra 813 truck chassis; this has a fully armoured cab with 40 rockets in ready-to-launch position and a pack of 40 more rounds immediately to the cab rear ready for rapid reloading. The M1972, which is used by Czechoslovakia, East Germany and Libya, is also fitted with a BZ-T hydraulically-operated dozer blade at the front of the hull to clear obstacles and level the ground. This blade is often fitted to other specialized Tatra 813 trucks such as those carrying bridging equipment.

More recently Tatra has introduced an improved model of the vehicle called the **Tatra T 815VT**, which has the same layout but many detailed modifications. Its cross-country payload has been increased to 10000 kg (22,046 lb), and a more powerful engine and modified gearbox have been installed. The chassis of the Tatra 815VT is also used as the basis for the Czech 152-mm Dana self-propelled gun, which entered production some years ago and has already been identified in service with the Czech and Libyan armies.

Specification

Tatra T 813

Crew: 1+6

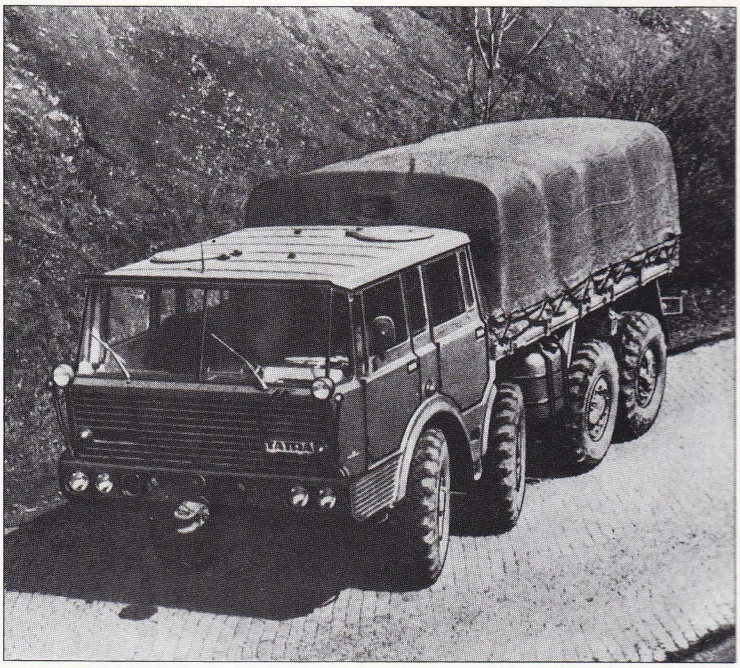
Weights: empty 14100 kg (31,085 lb); loaded 22000 kg (48,502 lb)

Powerplant: one Tatra T-930-3 12-cylinder diesel developing 186.4 kW (250 hp).

Dimensions: length 8.75 m (28 ft 8.5 in); width 2.50 m (8 ft 2.4 in); height 2.69 m (8 ft 9.9 in)

Performance: maximum road speed 80 km/h (50 mph); maximum road range 1000 km (621 miles); fording 1.4 m (4 ft 7 in); gradient 100 per cent; trench 1.6 m (5 ft 3 in); vertical obstacle 1.4 m (4 ft 7 in)

The Tatra 813 has exceptional cross-country mobility, with power-assisted steering on the front four wheels and a central tyre pressure regulation system that allows the driver to adjust tyre pressure to suit the type of ground being crossed.



USSR

MAZ-543

The KrAZ-255B 6×6 7500-kg (16,535-lb) vehicle is the heaviest truck in large-scale use with the Soviet army, although significant numbers of **ZIL-135** 8×8 and **MAZ-543** 8×8 trucks are used for specialized roles. The MAZ-543 was introduced in the 1960s and is manufactured at the Minsk Motor Vehicle Plant for both civil and military applications.

The layout of the MAZ-543 is unusual. The engine, which is the same as that used in the MAZ-537 series of 8×8 trucks and tractor trucks, is located at the front with a fully-enclosed crew compartment to each side. Each cab seats two people, one behind the other, and the whole cab can be tilted forwards to allow access to the engine. The cargo model can carry a payload of about 15000 kg (33,069 lb) across country or much more on roads. The rear cargo area has stake-type sides and a drop tailgate, and can be fitted with bows and a tarpaulin cover. Steering is power-assisted on the front two axles, and a central tyre pressure-regulation system is fitted as standard.

In addition to the cargo version, more specialized models include a tractor truck for towing semi-trailers and an airfield crash tender. The MAZ-543 is also used to transport and launch tactical nuclear missile systems such as the 'Scud-B' and 'Scaleboard'.

The ZIL-135 was originally designed by the Likhachev Motor Vehicle Plant, but production was undertaken by the Bryansk Motor Vehicle Plant for both civil and military use. The ZIL-135 is unusual in that it is powered by two ZIL-375 V-8 water-cooled petrol engines each developing 134.2 kW (180 hp), one engine driving the four wheels on one side of the vehicle. A central tyre pressure-regulation system is fitted, and powered steering is provided on the front and rear axles. This latter gives the vehicle a much smaller turning radius than 8×8 vehicles with steering on the front four wheels only.

When being used as a basic cargo truck the ZIL-135 can carry a maximum load of 10000 kg (22,046 lb), but it is most widely used to carry weapon systems such as the FROG-7 (Free Rocket Over Ground) surface-to-surface rocket, 'Sepal' cruise missile and more recently the BM-27 multiple rocket-launcher. Most of these have hydraulically-operated stabilizers that are lowered to the ground before the rockets or missiles are launched. To counter guerrilla attacks on convoys in Afghanistan, some ZIL-135 trucks have been fitted with twin 23-mm ZU-23 cannon, weapons normally used in the anti-aircraft role.

Specification

MAZ-543

Crew: 1+3

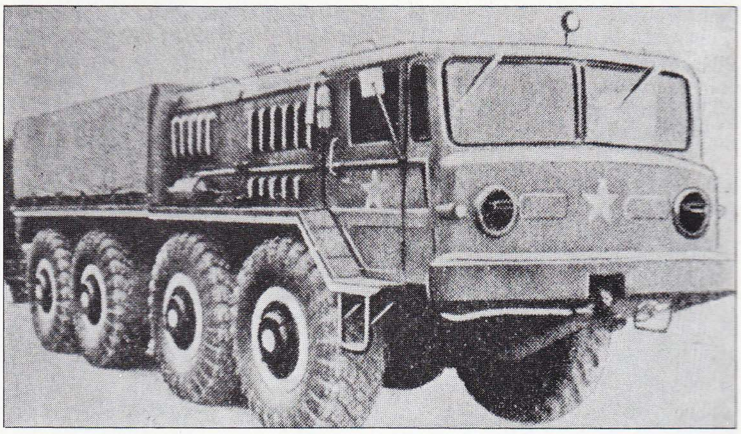
Weights: empty 18500 kg (40,786 lb); loaded 33500 kg (73,855 lb)

Powerplant: one D12A-525 V-12 water-cooled diesel developing 391.5 kW (525 hp)

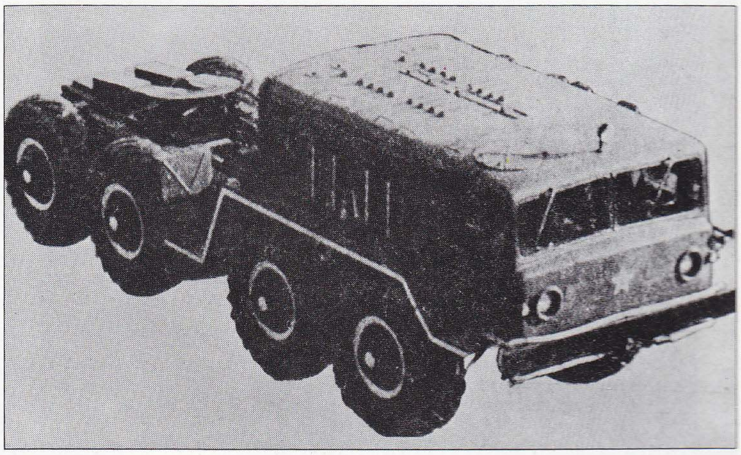
Dimensions: length 11.70 m (38 ft 4.6 in); width 3.02 m (9 ft 10.9 in); height 2.65 m (8 ft 8.3 in)

Performance: maximum road speed 70 km/h (43 mph); maximum range 500 km (311 miles); fording 1.0 m (3 ft 3 in); gradient 60 per cent; side slope 30 per cent; vertical obstacle 0.78 m (2 ft 7 in)

In addition to acting as a transport, erector and launcher for tactical missile systems, the MAZ-543 can be used as a cargo truck and can tow a loaded trailer.



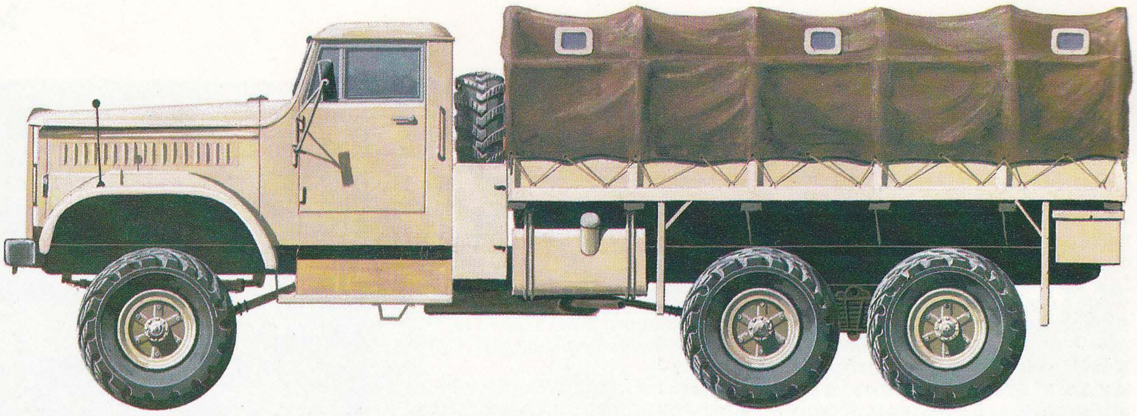
The MAZ-535A can tow loaded trailers weighing up to 50000 kg (111,231 lb) on roads, and is powered by a V-12 water-cooled diesel engine developing 375 hp (280 kW) at 1650 rpm – much less powerful than the engine installed in the MAZ-537 and MAZ-537A vehicles.



The MAZ-537 is widely used by the Soviet army to tow semi-trailers weighing up to 65000 kg (143,300 lb) on roads. The semi-trailer not only carries T-54/T-55, T-62 and T-72 tanks, but also heavy construction and specialized engineer equipment.

USSR

KrAZ-255B



Above: The KrAZ-255B is the standard 7500-kg (16,535-lb) truck in the Soviet army, and is also used for a wide range of specialized roles, including carrying engineer equipment such as cranes, and carrying and laying the TMM treadway bridge.

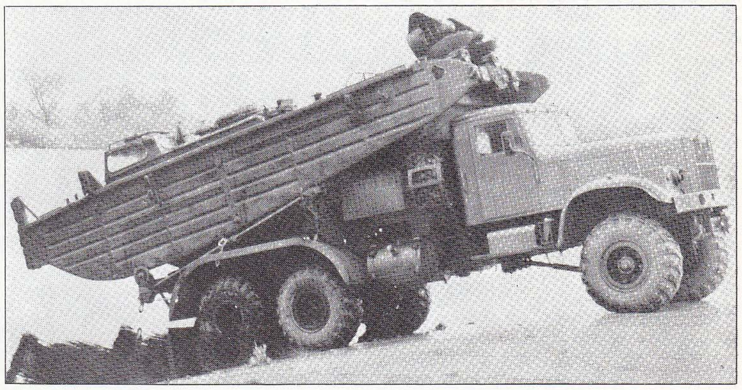
For many years the standard 7000-kg (15,432-lb) truck of the Soviet army was the **YaAZ-214** 6×6 model which was produced at the Yaroslavl Motor Vehicle Plant between 1956 and 1959, when production was transferred to Kremenchug Plant, where manufacture continued until 1967 under the new designation **KrAZ-214**. The latter vehicle was replaced in production by the **KrAZ-255B 6×6** truck which can carry a payload across country of 7500 kg (16,535 lb); the maximum towed loads are 30000 kg (66,139 lb) on roads or 10000 (22,046 lb) across country. The main improvements of the KrAZ-255B over the earlier truck can be summarized as increased payload, a more powerful engine, wider track and wheelbase, and the installation of a central tyre pressure-regulation system.

The layout of the KrAZ-255B is conventional, with the engine and transmission at the front, the two-door fully-enclosed cab in the centre and the cargo area at the rear. The last has fixed sides, a drop tailgate, removable bows and a tarpaulin cover. The engine is coupled to a manual gearbox with five forward and one reverse gear and a two-speed transfer case. Steering is hydraulic-assisted. Standard equipment includes a suspension lock-out system, a cab heater, an engine heater and a winch with a capacity of 12000 kg (26,455 lb).

As with most trucks today, there are a number of variants of the KrAZ-255B including the **KrAZ-255V** tractor truck, which can tow semi-trailers carrying vehicles or cargo on roads and across country. The **TZ 8-255B** is an 8000-litre (1,760-Imp gal) fuel tanker while the **ATsM 7-255B** is a 7000-litre (1,540-Imp gal) fuel tanker which can also tow the PTsM 8925 5800-litre (1,276-Imp gal) fuel trailer.

The KrAZ-255B is also used to carry and launch the PMP heavy floating pontoon bridge system, one truck being able to carry a bridge or shore pontoon: the truck backs up to the water, catches holding the pontoon are released and the pontoon slides off the back of the truck into the water where it automatically unfolds. The truck is also used to carry and launch the BMK-T bridging boat used to push PMP pontoons into position and to hold the bridge in place in strong currents. The TMM treadway bridge is carried and launched from a KrAZ-225B truck, the scissors type bridge being folded for travelling and pivoted at the rear. Other specialized engineer versions include the USM pile driving set used in the construction of bridges, the **E-305 BV** crane truck and the **ED-4421** excavator truck.

More recently the Soviets have introduced a new range of KamAZ trucks which are produced in 6×4 and 6×6 configurations, the latter model being called the **KamAZ-4310**.



A KrAZ-255B backs up to a river to launch a BMK-T bridging boat. When released, the BMK-T boat slides into the water where its twin rear-mounted propellers are swung downwards through 180 degrees. The BMK-T bridging boat is a key element in the PMP Ribbon Bridge System.

Specification

KrAZ-255B

Crew: 1+2

Weights: empty 11950 kg (26,345 lb); loaded 19450 kg (42,880 lb)

Powerplant: one YaMZ-238 V-8 diesel developing 179 kW (240 hp)

Dimensions: length 8.645 m (28 ft 4.4 in); width 2.75 m (9 ft 0.3 in); height (cab) 2.94 m (9 ft 7.75 in)

Performance: maximum road speed 71 km/h (44 mph); maximum road range 650 km (404 miles); fording 0.85 m (2 ft 10 in); gradient 60 per cent; side slope 30 per cent

A Soviet KrAZ-255B truck shows its fording capabilities. The KrAZ-255B replaced the KrAZ-214 in production in the Ukraine in 1967. Improvements include a more powerful engine developing 179 kW (240 hp) and a central tyre pressure system.

Belgium

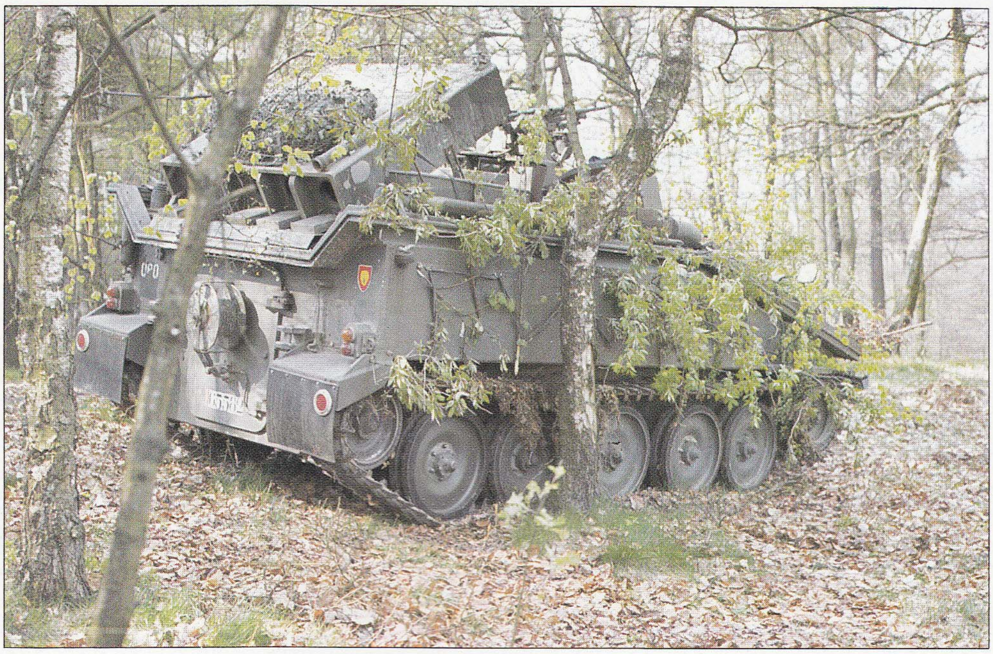
Belgium is part of NATO, and for a nation of its size and population (9.9 million) it maintains a considerable defensive stance. By the use of short-term conscription (eight months in West Germany or 10 months at home) and the use of a large force of immediate-recall reserves it maintains a force of nearly 95,000 under arms. The bulk of these are in the army, which has a strength of 69,670 including 27,525 conscripts.

The Army

The main NATO contingent is the I (Belgian) Corps based at Cologne-Junkersdorf, and it is deployed in such a way that 20 per cent of its units are based in Belgium and the rest in West Germany. In an emergency I (BE) Corps would operate to the south of I (Br) Corps in central Germany as part of the Northern Army Group (NORTHAG).

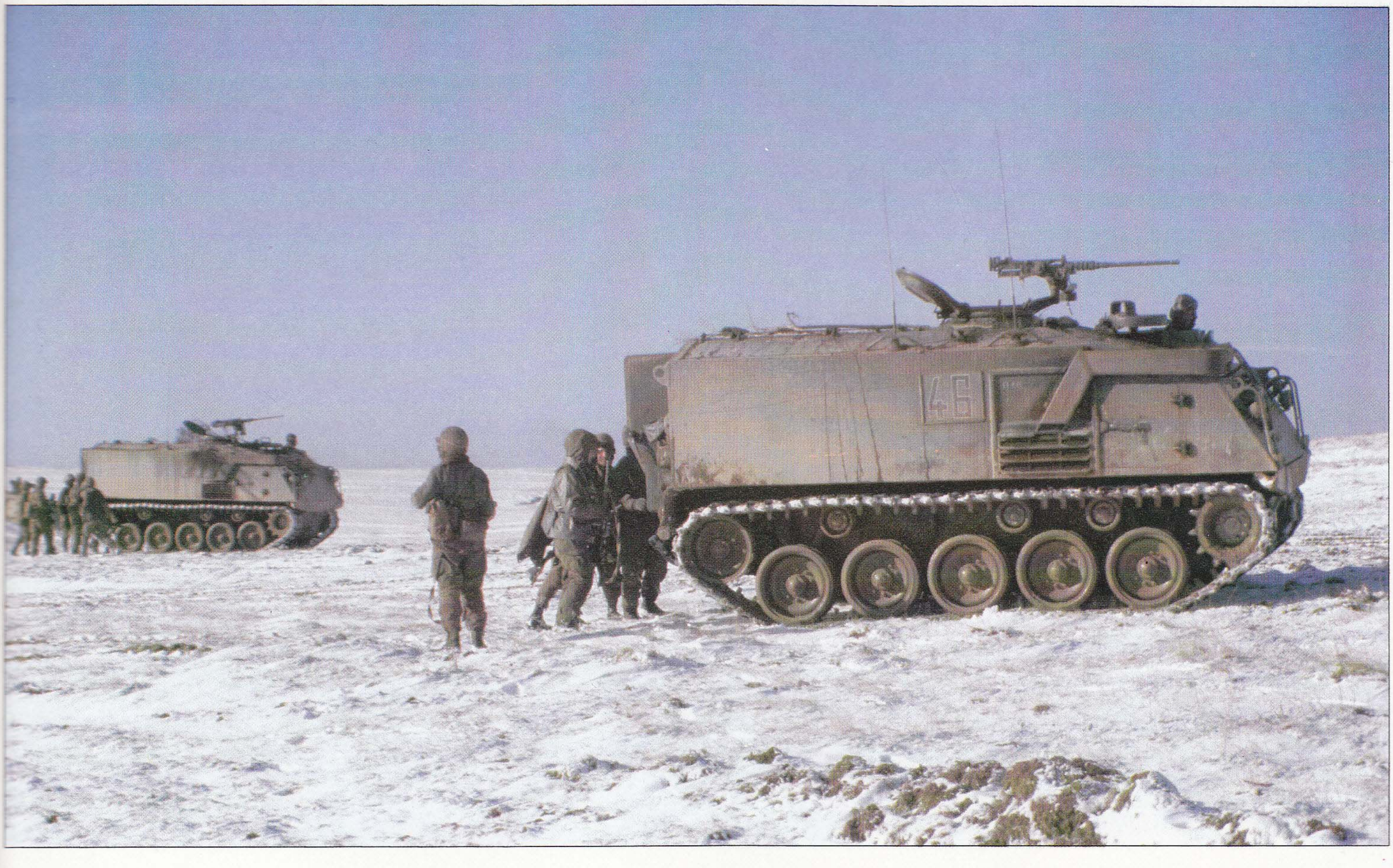
The Belgian army has in I (BE) Corps three armoured infantry brigades and one armoured brigade, with one motorized infantry and one armoured infantry brigade in reserve, plus corps artillery, signals, engineer, helicopter and anti-aircraft units. This force makes up the bulk of the Belgian army but there are other non-NATO units that include a single tank battalion, a para-commando regiment, and numerous medical and logistic units.

The basic infantry weapons are the FN FAL 7.62-mm (0.3-in) assault rifle and the FN MAG 7.62-mm machine-gun. For armour the Belgians have 334



Above: Just as the British army uses equipment of Belgian origin, so the Belgians use British kit, in this case a Striker, seen here with its five Swingfire missile launchers in the elevated position. The missiles can be launched by the controller from up to 100 m (110 yards) from the vehicle.

Below: Belgium is the last country to use the venerable M75 APC, which is soon to be replaced by FMC AIFVs and M113A2s. The M75 is operated by a two-man crew and can carry 10 infantrymen, who enter via two doors in the rear. Hatches are provided in the roof of the troop compartment.



British-designed and -built aircraft have often found their way into the Belgian air force, the Britten-Norman Islander being a current example. Delivered during 1976-7, the fleet is allocated to the School of Light Aviation, one of four army air squadrons.

Leopard tanks and a force of 133 Scorpion and 153 Scimitar reconnaissance vehicles equipping three reconnaissance battalions. A variety of APCs is used, including 266 Spartans amongst a total of 1,365 APCs, and artillery is American in origin. This ranges from 118 105-mm (4.13-in) howitzers up to 11 M110 203-mm (8-in) SP howitzers. There are also six Lance missiles. Some of the artillery is self-propelled. Anti-tank weapons include 274 Milan missiles, and Swingfire missiles are mounted on 43 Strikers. Anti-aircraft defence is centred in the field on 55 Gepard 35-mm anti-aircraft guns on Leopard chassis, but 37 Improved HAWK surface-to-air missiles are also used. For tank destroying there is a force of 80 JPzKs with 90-mm (3.54-in) guns.

The army has a small aviation force of 67 Aérospatiale II helicopters with 12 Britten-Norman Islander aircraft used for liaison and ambulance duties.

Army reserves number well over 160,000 but many of these are medical personnel and logistics support.

The Air Force

The bulk of the Belgian air force is based within Belgium, but much of it is assigned to NATO, eight squadrons being assigned to the 2nd Allied Tactical Air Force. These units are based at Beauvechain, Bierset, Florennes and Kleine Brogel. The total strength of the air force is some 144 aircraft, and the General Dynamics F-16s now in service were built in Europe, and have now replaced the Lockheed F-104Gs formerly in use.

For ground-attack missions there are five squadrons armed with either the Dassault Mirage 5BA or Mirage 5BD (54 aircraft) and the F-16A/B (36 aircraft). Thirty-six F-16As and F-16Bs are used by the two interceptor squadrons, and 18 Mirage 5BRs are used by the single reconnaissance squadron. For air defence there are six squadrons with 54 Nike Hercules surface-to-air missiles stationed in Germany.

The two transport squadrons are based around 12 Lockheed C-130Hs but also used are three BAe (HS) 748s, two Boeing 727s, two Dassault-Breguet Falcon 20s and five Swearingen Merlin IIIAs. A single search-and-rescue helicopter squadron uses five Westland Sea Kings and three Sikorsky HSS-1s. For training use there are 32 Dassault-Breguet/Dornier Alpha Jets, 28 SIAI-Marchetti SF.260MBs and 23 Aérospatiale (Fouga) Magisters. Manpower strength is 20,500 including 3,600 conscripts. Reserves total 14,000.

The Navy

The total manpower of the small Belgian navy is 4,550, including 1,035 conscripts (but excluding 4,500 immediate-recall reserves) and its three main bases are at Kallo, Ostend and Zeebrugge. The main role is coastal defence, and for this the principal surface strength is four 'E-71' class frigates armed with Exocet missiles. These are backed up by seven ex-American ocean minehunters/minesweepers and a further six coastal and 14 inshore minesweepers. There are two logistics and command ships and six river patrol boats. Three Alouette III helicopters are used for general utility purposes. The navy will have much enhanced mine warfare capability when 10 'Tripartite' type mine countermeasures ships are delivered.

The Gendarmerie

Although it is not officially part of the armed forces within Belgium, mention must be made of the Gendarmerie. Equipped as an anti-insurgent and internal security force, the Gendarmerie is 16,200 strong and uses 62 FN armoured cars, 80 BDX APCs and has its own force of eight helicopters (five Alouette IIs and three Aérospatiale Pumas). They are armed with rifles, sub-machine guns and some heavier weapons.

Order of Battle

Army

One armoured brigade
Three mechanized infantry brigades
Three reconnaissance battalions
One tank battalion
Two motorized infantry battalions
Three artillery battalions
One Lance battalion
One para-commando regiment
Four air-defence battalions
Five engineer battalions
Four army aviation squadrons

Air Force

Five fighter ground-attack squadrons (Mirage 5BA/BD, F-16A/B)
Two interceptor squadrons (F-16A/B)
One reconnaissance squadron (Mirage 5BR)
Six air defence missile squadrons (Nike Hercules)
Two transport squadrons (C-130H, Boeing 727QC, BAe 748, Merlin IIIA, Falcon 20)
One SAR helicopter squadron (Sea King)

Navy

Four 'E-71'-class guided-missile frigates
Seven 'Aggressive' class ocean minesweepers/minehunters
Six 'Adjutant' class coastal minesweepers/minehunters
14 'Herstal' class inshore minesweepers
Two logistic/command ships
Six river patrol craft
Three Alouette III helicopters
10 'Tripartite' type minehunters (on order)

Built under licence in Belgium by SABCA, the General Dynamics F-16 Fighting Falcon equips two interception squadrons. Even these have suffered their share of flying cutbacks due to cuts in the defence budget. This is the first F-16B two-seat trainer.